**Africa Research in Sustainable Intensification for the Next Generation (Africa RISING) West Africa Project**

**2017/2018 work plan Summary**

**Country: Mali**

**Program Purpose: To provide pathways out of hunger and poverty for smallholder families through sustainably intensified farming systems that sufficiently improve food, nutrition, and income security, particularly for women and children, and conserve or enhance the natural resource base.**

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| **Outcome 1: Farmers and farming communities in the project area are practicing more productive, resilient, and profitable and sustainably intensified crop-livestock systems linked to markets.** |  |  |  |
| **Output 1: Research products for more productive, intensive, diverse, profitable and resilient crop (cereals, legumes, and vegetables); livestock (sheep, goats, cattle, poultry and pigs) and integrated crop-livestock farming systems are identified and disseminated to farmers through development partners in the intervention communities.** |  |  |  |
| **Activity description** | **Theme/Activity leader/Agency** | **Team members** | **Budget (US$)** |
| **Activity 1: Test a combination of climate-smart crop varieties and agronomic practices to increase and sustain food and feed production.** | **Theme Leader: Bouba Traore**  **Deputy theme leader: Jean-Baptiste Tignegre** |  |  |
| Sub-activity 1.1: Effect of typologies (gender, soil position, mechanization level, market orientation and wealth) on production and adoption of rainy season vegetable and maize intercropping systems.  This was conducted in Phase 1. Data has not been published. We should concentrate on publication of the data rather than starting a new activity. | Jean-Baptiste Tignegre/ Wolrdveg | Felix Badolo/ICRISAT | 10000 |
| Sub-activity 1.2: Profitability and gender analysis of vegetable mono-cropping and intercrops- should be part of the vegetable sub-activity - see sub-activity 1. | Felix Badolo/ICRISAT | Jean Baptiste/WorldVeg | 10000 |
| Sub-activity 1.3: Evaluating effect of different fertilizer sources and treatment on the productivity of sorghum in the Sudanian zone of southern Mali.  Combine with sub-activity 15. Need to be sure to use more farmer-participatory approaches; and strengthen the agronomic component of the work in Mali. | Akinseye Folorunso/ICRISAT | Birhanu Zemadim/ICRISAT | 15000 |
| Sub-activity 1.4: Improving compost production for soil fertility management under inter cropping cereal-legume system in southern Mali. | Bouba Traore/ICRISAT | Mahamadou Dico, Karamoko Traore/ ICRISAT | 20000 |
| Sub-activity 1.5: Cost-benefit analysis of alternative systems for sorghum production -- shouldn't this be part of the cereal-legume systems research under sub-activity 2?  A paper was presented at the legacy workshop on this activity. What is the status of the paper? Do you really need 20k to finalize a paper? See comments on sub-activity 11. | Felix Badolo/ICRISAT | Mahamadou Dico, Karamoko Traore/ ICRISAT | 10000 |
| Sub-activity 1.6: Use CCAFS’ CSV approach to mainstream climate variability in the promotion and dissemination of integrated crop-livestock-soil systems for sustained productivity and reduced risk in Mali. | Mathieu Ouedraogo/CCAFS | Bouba Traore/ICRISAT | 20000 |
| **Activity 2: Test and disseminate a combination of improved breeds, housing, feeding, health and breeding practices to intensify rearing of livestock (sheep, goat, pig, and poultry) for meat, egg and milk production.** | **Theme Leader: Augustine Ayantunde**  **Deputy theme leader: Hamidou Nantume** |  |  |
| Sub-activity 2.1: Feed-health interventions for improved small ruminant production  I suggest this sub-activity is combined with sub-activities 5,6 and 34 under the leadership of ILRI with IER as a partner. Ensure the livestock activities are linked with the crop and nutrition activities and activities are farmer-participatory. | Augustine Ayantunde/ILRI | Hamidou Nantoume/IER | 60000 |
| Sub-activity 2.2: Test and disseminate poor forage upgrading technics for better feeding livestock during the dry season | Hamidou Nantoume/IER | Augustine Ayantunde/ILRI | 10000 |
| Sub-activity 2.3: Sheep fattening to reduce poverty and food insecurity for women farmers - combine with 4, and 5 | Hamidou Nantoume/IER | Augustine Ayantunde/ILRI | 15000 |
| **Activity 3: Test and disseminate integrated crop-livestock-soil systems to increase and sustain productivity and reduce risk.** |  |  |  |
| Sub-activity 3.1: Multi-criteria assessment and trade-off analysis of tested options at farm level, leading to options that are tailored to farmer contexts.  Consider joining with sub-activity 29. | Katrien Descheemaeker / WUR |  | 7500 |
| Sub-activity 3.2: Assess value chain constraints and opportunities for male, female and young farmers in the Koutiala area - combine with sub-activity 9 | Katrien Descheemaeker / WUR |  | 7500 |
| **Activity 4: Evaluate and disseminate agroforestry systems to increase and sustain productivity and reduce risk.** |  |  |  |
| **Output 2: : Integrated management technologies and practices to improve and sustain productivity and ecosystems services of the soil, land, water and vegetation resources are developed and disseminated with farmers and development partners in the intervention communities.** |  |  |  |
| **Activity 1: Test and disseminate land, soil and integrated land-soil technologies and practices to improve and sustain productivity and ecosystems services at the farm and landscape/watershed levels.** | **Theme Leader:** Birhanu Zemadim  **Deputy theme leader:** Kalifa Traore |  |  |
| Sub-activity 1.1. Investigate the impact of land management practices over time on the productivity and economic benefits on major cereal crops (sorghum, millet and maize) in different agro-ecologies  Sub-activities 10, 12,8 13 and 14 should be part of this sub-activity. Under the leadership of ICRISAT with IER as partner. The land management and soil and water related research should relate to the agronomic research (sub-activities 1 and 2 and 15).  What are the plans for publishing the data from phase 1 | Birhanu Zemadim/ICRISAT | Ramadjita Tabo, Felix Badolo, Mahamadou Dicko and Karamoko Traore/ICRISAT  Kalifa Traore/IER | 20000 |
| Sub-activity 1.2: Land Ownership and Technology Adoption: Evidence from Southern Mali using IFPRI surveyed data combine with sub-activity 14 (see comments on sub-activity 14) | Moussa Sankara/ICRISAT | Birhanu Zemadim/ICRISAT | 0 |
| Sub-activity 1.3: Improving crop livestock productivity and household income through the use of contour bunding and agroforestry options - see comments on sub-activity 14. What is the status of the data from phase 1? We should focus on publication of the data from phase 1. | Kalifa Traore/IER | Birhanu Zemadim/ICRISAT | 10000 |
| Sub activity 1.4: Field measurement and nutrient quality assessment of runoff, erosion, soil water content, water table and vegetation from field to watershed scale under different land use and land management practices.  See comments on sub-activity 14. What are the plans for publishing the data from phase 1? | Kalifa Traore/IER | Birhanu Zemadim/ICRISAT | 15000 |
| **Activity 2: Test and promote water management technologies and practices to increase water productivity in the small-scale crop-livestock farming systems under rain-fed and irrigated conditions.** |  |  |  |
| **Activity 3: Test and promote integrated soil fertility and integrated pest management technologies and practices to increase and sustain productivity and reduce risk**. |  |  |  |
| **Output 3: Labor-saving and gender-sensitive technologies in target areas to reduce drudgery while increasing labor efficiency in the production cycle delivered.** |  |  |  |
| **Activity 1: Support local partners through training on appropriate drudgery-reducing technology delivery.** |  |  |  |
| Sub-activity 1.1: |  |  |  |
| Sub-activity 1.2: |  |  |  |
| **Activity 2: Introduce, test and adapt existing pre-harvest and post-harvest small-scale mechanization options.** |  |  |  |
| Sub-activity 2.1: |  |  |  |
| Sub-activity 2.2: |  |  |  |
| **Outcome 2: More farmers and farm families in the intervention communities are adopting technologies and practices to improve nutrition, food and feed safety, post-harvest handling and value addition.** |  |  |  |
| **Output 1: Improved technologies, practices and habits to increase production and consumption of diverse and more nutritious food by farm families, especially by women and children are developed.** |  |  |  |
| **Activity 1: Develop a nutrition strategy to harmonize the nutrition activities national nutrition approaches and link them to the crop and livestock activities** | **Theme Leader: Caroline Sobgui**  **Deputy theme leader: Augustine Ayantunde** |  |  |
| Sub-activity 1.1: Evaluation of nutrition-sensitive-agriculture options in West Africa | Augustine Ayantunde/ILRI, | Caroline Makamto Sobgui/WorldVeg, Jean Baptiste Tignegre/WorldVeg, Nantoume Hamidou/IER, Pierre Coulibaly/AMEDD | 20000 |
| Sub-activity 1.2: Evaluate and promote dry season vegetable varieties (tomato, pepper, Eggplant and onion), with optimized integrated and profitable crop management practices from field to storage and consumption (use of optimized fertilizer, irrigation options under zero energy and ecological storage facilities (use of Zero Cooling Energy chambers for fresh fruit and leafy vegetables and zero energy and ecological onion cribs that preserve product quality). | Jean-Baptiste Tignegre/ Wolrdveg | Caroline Makamto Sobgui/WorldVeg,  Augustine Ayantunde/ILRI, | 30000 |
| Sub-activity 1.3: Strengthen capacity of local communities to prevent and address malnutrition though integrated agriculture, nutrition and health activity and communication for social and behavior change. This is a cross-cutting activity - should be incorporated into the crop, livestock and vegetable activities. The nutrition research should not stand alone if we are talking of nutrition sensitive agriculture. The integrated agriculture and nutrition activities should be part of the cereal, legume vegetable activities; meaning that the nutrition research should be integrated into the crop and livestock activities.  The external evaluation team recommended that the nutrition research should be used as a forum to involve young women. How is this factored into the planning of research? What is the progress on publishing the data from phase 1? | Caroline/ World Vegetable Centre | Jean-Baptiste Tignegre/ Wolrdveg, Augustine Ayantunde/ILRI, | 30000 |
| Sub-activity 1.4: Evaluate and disseminate best processing technologies that keep nutrient losses to a minimum in fruit and vegetables- Where is the research? Capacity building is cross-cutting and should be part of all the planned research activities! What is the progress on the papers submitted at the legacy meeting? May be you should concentrate on finalizing the papers rather than starting new activities. | Diallo Fatimata Cisse, LTA/IER |  | 10000 |
| **Activity 2: Build capacity of farm families, especially women to produce and consume diverse and more nutritious food** |  |  |  |
| **Activity 3: Use nutrition focused activities as an entry point for greater involvement of younger women and the youth** |  |  |  |
| **Output 2: Postharvest technologies and practices are tested and disseminated to farmers and other partners to reduce postharvest losses** |  |  |  |
| **Activity 1: Introduce, evaluate, adapt and disseminate existing postharvest technologies and practices.** |  |  |  |
| **Activity 2: Build capacity of farm families to reduce postharvest losses** | **Theme Leader:** Diallo Fatimata  **Deputy theme leader:** Oumar Samake |  |  |
| Sub-activity 2.1: Train trainers (technicians, partners and community leaders) on the best processing and conservation techniques - Which research activity is this related to? Capacity building cross-cutting and should be part of all planned research activities! | Diallo Fatimata Cisse, LTA/IER | Oumar B. SAMAKE, Pierre COULIBALY /AMEDD | 10000 |
| Sub-activity 2.2: Train farmers in cooperatives principles, contracting and post-harvest handling and quality management | Oumar B. SAMAKE/AMEDD | Pierre COULIBALY/AMEDD  Diallo Fatimata Cisse | 15000 |
| **Outcome 3: Farmers and other value chain actors have greater and equitable access to production assets and markets (input and output) through enabling institutions and policies.** |  |  |  |
| **Output 1: Improved policies and institutional arrangements to increase participation of farm families, especially women and youth in the output and input markets and decision-making are developed.** |  |  |  |
| **Activity 1: Review existing policies and institutional arrangements affecting equitable access to production assets and markets.** |  |  |  |
| **Output 2: Options to increase access to production assets and increase participation in decision-making by women, youth and other vulnerable groups.** |  |  |  |
| **Activity 1: Identify constraints to, and opportunities for increasing women and youth access to production assets in the target area.** |  |  |  |
| **Outcome 4: Effective partnerships to ensure delivery and uptake at scale of SI, technologies and practices are established with farmers, local communities, and research and development partners in the private and public sectors.** |  |  |  |
| **Output 1: Understanding of the social, economic, and institutional constraints to and opportunities for technology adoption from different farm typologies improved.** |  |  |  |
| **Activity 1: Conduct cost-benefit and gender analysis coupled with other socio-economic analyses to identify and quantify adoption constraints and opportunities for different farmer contexts.** |  |  |  |
| **Activity 2: Map and assess relevant stakeholders to establish dialogue for the exploration of mutual synergies for scaling delivery of validated technologies.** | **Theme Leader:** Oumar Samake  **Deputy theme leader:** Baloua Neibe |  |  |
| Sub activity 2.1: Consolidating existing platforms, concurrently leading multi stakeholder platform meetings at village level, and lead the organization of farmer to farmer exchange visits. | Oumar B. SAMAKE/AMEDD | Arouna BAYOKO, Pierre COULIBALY /AMEDD | 30000 |
| **Activity 3: Leverage/link and integrate (engagement and outreach) with existent initiatives including Government extension systems to support and encourage the delivery pathways.** | **Theme Leader:** Oumar Samake  **Deputy theme leader:** Baloua Neibe |  |  |
| Sub-activity 3.1: Competition organization between communities to stimulate adoption of technological innovations | Oumar B. SAMAKE/AMEDD | Arouna BAYOKO, Pierre COULIBALY | 20000 |
| Sub-activity 3.2: Strengthen the capacity of NGOs (AMASSA, CAAD, FENAB, GRAADECOM), extensions services (Agriculture, Livestock, Forestry) and farmers organization for the technological packages widely dissemination | Oumar B. SAMAKE/AMEDD | Arouna BAYOKO, Pierre COULIBALY, CAAD, GRADCOM, FENABI | 25000 |
| **Output 2: Gender-sensitive decision support tools for farmers to assess technology-associated risk and opportunity developed tested and launched.** |  |  |  |
| **Activity 1: Identify and communicate gender-sensitive decision support technologies in the context of different farm typologies.** |  |  |  |
| **Output 3: A technology adoption, monitoring, and evaluation framework for use by the project team and scaling partners developed and released.** |  |  |  |
| **Activity 1: Monitor and modify the progress of technology adoption process towards scaling.** | **Theme Leader:** Oumar Samake  **Deputy theme leader:** Baloua Neibe |  |  |
| Sub activity 1.1: Scaling up of high yielding hybrids and dual/multi-purpose sorghum for crop and livestock integration and income generation in Sikasso region/Mali | Aboubacar TOURE/ICRISAT | Baloua NEBIE, Mamourou SIDIBE, Abdoulaye G. DIALLO/ ICRISAT | 10000 |
| Sub activity 1.2: Dissemination of sustainable natural resources management technologies implemented as technological packages (contour bunding, agro-forestery options etc.) in the districts of Sikasso, Koutiala, Bougouni, Yorosso | Oumar B. SAMAKE, Oumane DEMBELE, Pierre COULIBALY/ AMEDD | Mahamadou Dicko, Karamoko Traore | 35000 |
| Sub activity 1.3: Promote the use of both vegetables and agroforestry species (tomato, aubergine, okra, tamarind, baobab, moringa) | Oumar B. SAMAKE, Oumane DEMBELE, Pierre COULIBALY/ AMEDD | Mahamadou Dicko, Karamoko Traore, Jean Baptiste | 25000 |
| Sub-activity 1.4: Development and formalization of local conventions including demarcation of livestock corridors - can this joined with sub-activities 4, 5 and 6? How different will this be from the phase 1 activities? | Augustine Ayantunde/ILRI | Hamidou Nantoume/IER | 20000 |
| **Output 4: Knowledge sharing centers and learning alliances within existent local and regional institutions including development actors developed.** |  |  |  |
| **Activity 1: Establish knowledge-sharing and learning alliances among scaling actors.** | **Theme Leader:** Birhanu Zemadim  **Deputy theme leader:** Felix Badolo/Moussa Sankara |  |  |
| Sub-activity 1.1: Africa RISING Mali Project Management & Operation of four technology parks as sites for research and dissemination hubs, and communication. | Birhanu Zemadim, Karamoko Traore, Mahamadou Diko,/ICRISAT | Mahamadu Dicko, Karamoko Traore, Salmoye Coulibali, CAAD/GRADCOM/FENABI | 275500 |
| Sub-activity 1.2: Organization of nutritional clusters in connection with community health centres and rural communes | Oumar B. SAMAKE/AMEDD | Pierre COULIBALY, Jeannette KAMATE, Nantenin DEMBELE/AMEDD | 25000 |
| Sub Total |  |  | 811500 |
| Sub Total-WorldVeg |  |  | 741500 |
| ICRISAT Overhead=(Sub Total-WorldVeg)\*18.7% |  |  | 138660 |
|  |  |  | **950575** |
|  |  |  |  |

**Mali Work plan Activity Description for the 2017/2018**

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| Outcome 1: Farmers and farming communities in the project area are practicing more productive, resilient, and profitable and sustainably intensified crop-livestock systems linked to markets. |
| Output 1: Research products for more productive, intensive, diverse, profitable and resilient crop (cereals, legumes, and vegetables); livestock (sheep, goats, cattle, poultry and pigs) and integrated crop-livestock farming systems are identified and disseminated to farmers through development partners in the intervention communities. |

**Activity 1: Test a combination of climate-smart crop varieties and agronomic practices to increase and sustain food and feed production.**

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| Sub-activity 1.1 | Effect of typologies (gender, soil position, mechanization level, market orientation and wealth) on production and adoption of rainy season vegetable and maize intercropping systems | | | | | | | | | | | | | | | | | | | | | | |
| Research team | | | | | | | | | | | | | | | | | | | | | | | |
| Name | | | | | | | Institution | | | | | Role | | | | | | | | | | | |
| Jean-Baptiste Tignegre | | | | | | | World Vegetable Center, Mali | | | | | Project manager, plant breeder | | | | | | | | | | | |
| Caroline M. Sobgui | | | | | | | World Vegetable Center, Mali | | | | | Nutritionist | | | | | | | | | | | |
| Badolo Felix | | | | | | | ICRISAT | | | | | Cost-benefit analysis-Profitability | | | | | | | | | | | |
| Traore Boubacar | | | | | | | ICRISAT | | | | | Effects of land position and rainfall patterns on technology performance and adoption | | | | | | | | | | | |
| Gender expert | | | | | | | ICRISAT | | | | | Social and human effects on technology performance and adoption | | | | | | | | | | | |
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| Student(s) | | | | | | | | | | | | | | | | | | | | | | | |
| Name | | | | | Institute | | | | | | Degree | | | | | Start | | | | End | | | |
| Kanoute Moussa | | | | | University of Ouagadougou, Burkina Faso | | | | | | Ph.D. | | | | | March 2017 | | | | February 2020 | | | |
| A student on “the effects of social status and gender on technology profitability (cost benefit analysis)” | | | | | University of development studies, Tamale | | | | | | M.Sc. | | | | | June 2017 | | | | May 2019 | | | |
| Diaga Mountaga | | | | | IPR/IFRA Katibougou | | | | | | M.Sc. | | | | | March 2017 | | | | February 2020 | | | |
|  |  | | | | | | | | | | | | | | | | | | | | | | |
| Location(s) | Bougouni and Koutiala | | | | | | | | | | | | | | | | | | | | | | |
| Start | April 2017 | | | | | | | | | | | | | | | | | | | | | | |
| End | November 2017 | | | | | | | | | | | | | | | | | | | | | | |
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| 1. Justification | | | | | | | | | | | | | | | | | | | | | | | |
| Okra, tomato, hot pepper, African eggplant and roselle are the major vegetables intercropped with maize in Ghana during the humid season. Damages by insect pests and diseases are often higher under sole cropping than intercropping systems. Populations of insects such as aphid and thrips are significantly reduced in cowpea-sorghum intercrops (Nampala *et al.*, 2002). Pest and disease pressure are moderate in chili-maize (Gutierrez, 1999) and tomato-maize (Pino *et al*., 1993). The effect of intercropping on pests and diseases reduces the effort and inputs required for crop protection. Positive physiological interactions can sometimes be observed from intercropping. There may be a symbiotic cohabitation between the two crops where intercropping reduces soil erosion due to optimum coverage of the soil (Zougmoré *et al.*, 2001). Optimized population densities and spatial arrangements for intercropped vegetables were developed for maize-vegetable intercrops in Northern Ghana. Our objective was to determine their profitability and how the biological yields resulting from various spatial arrangements and planting densities of intercrops is affected by the typologies of trial sites. | | | | | | | | | | | | | | | | | | | | | | | |
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| 2. Objectives | | | | | | | | | | | | | | | | | | | | | | | |
| 2.1 Determine the profitability of Maize vegetable intercrops in the humid season | | | | | | | | | | | | | | | | | | | | | | | |
| 2.2 Determine how social status and gender affect maize-vegetable intercropping system performance and adoption | | | | | | | | | | | | | | | | | | | | | | | |
| 2.3 Determine the effect of land position on maize-vegetable system performance | | | | | | | | | | | | | | | | | | | | | | | |
| 2.4 Disseminate approved and optimized maize vegetable intercrops | | | | | | | | | | | | | | | | | | | | | | | |
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| 3. Research questions | | | | | | | | | | | | | | | | | | | | | | | |
| 3.1 What are the influences of typologies on the choice of vegetable and cereal inter-croping options by farmers? | | | | | | | | | | | | | | | | | | | | | | | |
| 3.3 Which components of landscape typologies determine productivity and adoption by farmers? | | | | | | | | | | | | | | | | | | | | | | | |
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| 4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc). | | | | | | | | | | | | | | | | | | | | | | | |
| 4.1 Survey on the effect of the typologies on maize-vegetable intercropping system  The study sites will be conducted on different agro-ecological zones: Bougouni and Koutiala and partners’ intervention zones. In each agro-ecological zones, a survey will be implemented on 200 individual farmers including 50% of female farmers, with good distribution of farmers across contrasting typologies in the landscape to capture the variation among farmers on gender, farm land position, wealthiest, market orientation of produces and rainfall pattern over time in farmers’ fields. Individual interviews will be conducted based on check list questionnaires to know farmers’ choices amongst the different intercropping options and a classification of farmers in the above categories will be made according to the following typologies: (i) high land, (ii) low land, (iii) wealthy farmers, (iv) poor farmers, (v) market oriented production and (vi) production for auto consumption, (vii) sufficient rainfalls and well distributed in time and (viii) insufficient rainfalls. | | | | | | | | | | | | | | | | | | | | | | | |
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| 5. Data to be collected and uploaded | | | | | | | | | | | | | | | Responsibility/Institute | | | | | | | | |
| Typologies: Gender status | | | | | | | | | | | | | | | IPGRI | | | | | | | | |
| Farm position in the landscape; rainfall amount & repartition in time | | | | | | | | | | | | | | | WorldVeg | | | | | | | | |
| Farmers’ wealthiest, market orientation, labor cost, input amount and cost, quantity of produce autoconsumed and sold and income generated, profitability | | | | | | | | | | | | | | | ICRISAT economist (Mali)  IITA economist(Ghana) | | | | | | | | |
| Biological data: Data to be collected on the maize include plant height at 50% tasseling, cob weight and grain yield.  Data to be collected on vegetables include plant height at 50% flowering, number of leaves/plant, number of fruits/plot and fruit weight (1st , 2nd and 3rd harvest);  In addidtion, records will be taken on farmer sex, age, wealthiest, farm land GIS position, rainfalls | | | | | | | | | | | | | | | WorldVeg | | | | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | |
| 6. Milestones | | | | | | | | | | | | | | | | | | | | | | | |
| Deliverables | | | | | | | | | Means of verification | | | | | | | | | | Date | | | | |
| At least one survey on typologies implemented before allocation of demonstrations/technologies to farmers | | | | | | | | | Survey questionnaires, reports | | | | | | | | | | June 2017 | | | | |
| At least three farmers preferred technologies identified by June, 2017 by World Veg. | | | | | | | | | Number of technologies selected by farmers, report | | | | | | | | | | June 2017 | | | | |
| At least 200 farmers implemented vegetable - maize intercrops under diverse typologies in Bougouni and Koutiala | | | | | | | | | Number of women farmers who implemented the technologies; number of market oriented farmers; number of farms in low lands; number of wealthy farmers, report | | | | | | | | | | January 2018 | | | | |
| 6.4 Scientific article writing | | | | | | | | | One manuscript proposed for review | | | | | | | | | | December 2018 | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | |
| 7. Sustainable intensification indicators | | | | | | | | | | | | | | | | | | | | | | | |
| 7.1 Productivity | | | Production Yield (kg/ha), fruit or grain quality (commercial yield)  Farmer perceptions and ratings of technology yield performance | | | | | | | | | | | | | | | | | | | | |
| 7.2 Environmental | | | Quantity applied per ha by type; Farmer perceptions of water availability | | | | | | | | | | | | | | | | | | | | |
| 7.3 Economic | | | Profitability; kg output / unit input | | | | | | | | | | | | | | | | | | | | |
| 7.4 Social | | | Rating of technologies across locally determined categories (1-3); Access to production factors (mechanization, land)1-4; Decision-making about production, marketing (by crop)1-4; Women Empowerment in Agriculture Index (1 and 4) | | | | | | | | | | | | | | | | | | | | |
| 7.5 Human | | | Literacy and numeracy of adults (1,2) | | | | | | | | | | | | | | | | | | | | |
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| Sub-activity 1.2 | | Profitability and gender analysis of vegetable mono-cropping and intercropping | | | | | | | | | | | | | | | | | | | | |
| Research team | | | | | | | | | | | | | | | | | | | | | | |
| *Name* | | | | | | | | *Institution* | | | | | | *Role* | | | | | | | | |
| Felix Badolo | | | | | | | | ICRISAT | | | | | | Conduct economic analysis | | | | | | | | |
| Bekele Kotu | | | | | | | | IITA | | | | | | Contribute to economic analysis | | | | | | | | |
| TIGNEGRE Jean-Baptiste | | | | | | | | AVRDC | | | | | | Conduct on-farm trials | | | | | | | | |
| Jumia Yilla | | | | | | | | ICRISAT | | | | | | Gender specialist | | | | | | | | |
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| e. Student(s) – None | | | | | | | | | | | | | | | | | | | | | | |
| Name | | | | | | Institute | | | | | | | Degree | | | | | Start | | | | End |
| 1. | | | | | |  | | | | | | |  | | | | |  | | | |  |
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| f. Location(s) | | Bougouni and Koutiala (Mali) | | | | | | | | | | | | | | | | | | | | |
| g. Start | | April 2017 | | | | | | | | | | | | | | | | | | | | |
| h. End | | February 2018 | | | | | | | | | | | | | | | | | | | | |
| 1. Justification | | | | | | | | | | | | | | | | | | | | | | |
| There is a lack of economic information, and gender analysis concerning the vegetable mono-cropping and intercropping. The study aims to evaluate selected technologies from the socio-economic point of view, and taking into account the gender disaggregation. | | | | | | | | | | | | | | | | | | | | | | |
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| 2. Objectives | | | | | | | | | | | | | | | | | | | | | | |
| 2.1 – Evaluate yields and cash income per hectare of the vegetable mono-cropping and intercropping taking into account the gender disaggregation | | | | | | | | | | | | | | | | | | | | | | |
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| 3. Research questions | | | | | | | | | | | | | | | | | | | | | | |
| 3.1 - What is the profitability of vegetable mono-cropping and intercropping systems? | | | | | | | | | | | | | | | | | | | | | | |
| 4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc). | | | | | | | | | | | | | | | | | | | | | | |
| 4.1 – Plot survey | | | | | | | | | | | | | | | | | | | | | | |
| 4.2 – Cost and benefit method | | | | | | | | | | | | | | | | | | | | | | |
| 5. Data to be collected and uploaded | | | | | | | | | | | | | | | | | Responsibility/Institute | | | | | |
| 5.1 – On-farm trials data | | | | | | | | | | | | | | | | | WorldVeg | | | | | |
| 6. Milestones | | | | | | | | | | | | | | | | | | | | | | |
| Deliverables | | | | | | | | | | Means of verification | | | | | | | | | | | Date | |
| 6.1 – Cost and benefit report | | | | | | | | | | Report finalized | | | | | | | | | | | February 2018 | |
| 6.2 | | | | | | | | | |  | | | | | | | | | | |  | |
|  | | | | | | | | | | | | | | | | | | | | | | |
| 7. Sustainable intensification indicators | | | | | | | | | | | | | | | | | | | | | | |
| 7.1 Productivity | | | | Yields per hectare | | | | | | | | | | | | | | | | | | |
| 7.2 Environmental | | | |  | | | | | | | | | | | | | | | | | | |
| 7.3 Economic | | | | Net income per hectare | | | | | | | | | | | | | | | | | | |
| 7.4 Social | | | |  | | | | | | | | | | | | | | | | | | |
| 7.5 Human | | | |  | | | | | | | | | | | | | | | | | | |
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| Sub-activity 1.3 | Evaluating effect of different fertilizer sources and treatment on the productivity of sorghum in the Sudanian zone of Mali. | | | | | | | | | | | | | | |
| **Research team:** | | | | | | | | | | | | | | | |
| ***Name*** | | | | ***Institution*** | | | | | ***Role*** | | | | | | |
| Birhanu Zemadim | | | | ICRISAT- Mali | | | | | Activity leader | | | | | | |
| Akinseye Folorunso | | | | ICRISAT- Mali | | | | | Postdoctoral fellow | | | | | | |
|  | | | | | | | | | | | | | | | |
| **Student(s)** | | | | | | | | | | | | | | | |
| Name | | | | Institute | | | | Degree | | Start | | | | End | |
| 1. SINARE Boubacar | | | | Bayero University, Kano, Nigeria | | | | PhD | | March,2017 | | | | March, 2020 | |
| 2. | | | |  | | | |  | |  | | | |  | |
| 3. | | | |  | | | |  | |  | | | |  | |
|  |  | | | | | | | | | | | | | | |
| **f. Location(s)** | Bamako, Koutiala and Bougouni region | | | | | | | | | | | | | | |
| Start | April, 2017 | | | | | | | | | | | | | | |
| End | Dec, 2017 | | | | | | | | | | | | | | |
| **Justification**  Studies have shown that optimum productivity in crops may not be achieved without appropriate fertility management. In Sudanian region of Mali where sorghum is an important crop, inorganic fertilizer use is limited due to high cost and non-availability, and limited soil moisture availability. However, with large available organic resources from livestock and poultry manure due to crop-livestock integration practice by the farmers, the study will evaluate different fertility scenarios which will combine both organic and in-organic sources. Our target would be to increased productivities (grain and biomass) while the biomass production could further used as source of feed for the livestock and vice-versa. | | | | | | | | | | | | | | | |
| **2. Objectives** | | | | | | | | | | | | | | | |
| 2.1 To acquire a better understanding of physiological functioning and yield potential of sorghum varieties under different fertilizer management (livestock manure and inorganic fertilizer) across different rainfall gradient | | | | | | | | | | | | | | | |
| 2.2 Evaluating the productivity of the sorghum varieties under current agricultural management practices to climate change | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | |
| **3.** **Research questions** | | | | | | | | | | | | | | | |
| 3.1 How to increase sorghum productivity through climate resilient farming practices? | | | | | | | | | | | | | | | |
| 3.3 What is the sensitivity of the current yield to climate change using high resolution climate Models (GCMs) output/ | | | | | | | | | | | | | | | |
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| **4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc).** | | | | | | | | | | | | | | | |
| 4.1 An experiment will be conducted to evaluate the different sources of livestock manure and the rates on productivities of sorghum in the Sudan savannah of Mali. The treatments include nine (9) different fertility sources [synthetic fertilizer (DAP), cow manure, poultry manure and the combination of cow manure] and a control with three (3) varieties of sorghum in three different agro-ecological zones (Bamako, Koutiala and Bougouni region). | | | | | | | | | | | | | | | |
| 5. Data to be collected and uploaded | | | | | | | | | | Responsibility/Institute | | | | | |
| 5.1. Agronomic , basis crop physiology and soil data | | | | | | | | | | ICRISAT | | | | | |
| 5.2. Climate data which include daily rainfall, temperatures, solar radiation and relative humidity | | | | | | | | | | ICRISAT | | | | | |
|  | | | | | | | | | | | | | | | |
| **6. Milestones** | | | | | | | | | | | | | | | |
| **Deliverables** | | | | | **Means of verification** | | | | | | | | **Date** | | |
| 6.1 Best fertility management practices that will contribute to increase sorghum productivity and also economically viable for smallholder farmer. | | | | | On- station field trial | | | | | | | | Dec.,2017 | | |
| 6.2 Optimistic fertility scenarios to future climate | | | | | Decision support tools (e.g. APSIM and DSSAT) | | | | | | | |  | | |
|  | | | | | | | | | | | | | | | |
| **7. Sustainable intensification indicators** | | | | | | | | | | | | | | | |
| 7.1 Productivity | | |  | | | | | | | | | | | | |
| 7.2 Environmental | | |  | | | | | | | | | | | | |
| 7.3 Economic | | |  | | | | | | | | | | | | |
| 7.4 Social | | |  | | | | | | | | | | | | |
| 7.5 Human | | |  | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | |
| Sub-activity 1.4 | | Improving soil fertility management under cereal cropping system in southern Mali | | | | | | | | | | | | |
| Research team | | | | | | | | | | | | | | |
| Name | | | Institution | | | Degree | Research interest | | | | Role | | | |
| Bouba Traore | | | ICRISAT | | | PhD | System agronomist | | | | Leader, scientist | | | |
| Birhanu Zemadim | | | ICRISAT | | | PhD | Land and water management | | | | Scientist | | | |
| Ramadjita Tabo | | | ICRISAT | | | PhD | System Agronomist | | | | Scientist | | | |
| Boubacar Sinare | | | ICRISAT | | | MSc | Crop production | | | | Research assistant | | | |
|  | | | | | | | | | | | | | | |
| Partner(s) | | AMEDD, IER | | | | | | | | | | | | |
| Graduate (s) | | 02 | | | | | | | | | | | | |
| Location(s) | | Mali (Koutiala and Bougouni) | | | | | | | | | | | | |
| Start | | March 2017 | | | | | | | | | | | | |
| End | | January 2018 | | | | | | | | | | | | |
| **1. Justification** | | | | | | | | | | | | | | |
| Soil fertility management is an issue of national concern in most African countries where agricultural sector often represents as much as 50% of gross domestic product (GDP). Soil fertility management is also an important component of the Poverty Reduction Strategy Plan for those countries – including Mali, where sorghum, pearl millet and maize are major subsistence crops. Soil fertility in Mali is characterized by low natural/inherent fertility of most soils (Piéri 1989), low use of both organic and mineral fertilizer (van der Pol,1992) and poor cultural/agronomic practices.  Low soil fertility is very marked, especially in the area, where the low soil organic matter content leads to low efficiency of mineral fertilizers (Kanté 2001). Crop fertilization is mainly based on mineral fertilizers at the expense of organic fertilizer, which are nevertheless essential for soil fertility restauration (Annabi et al. 2007).  Ensuring sustainable agriculture requires the implementation of methods to balance nutrients and to maintain soil organic matter. There is an urgent need to improve the management of different types of SOM input. Currently, main organic resources already used or potentially available to farmers are those based on compost and manure. In the study area-increasing use has been made of organic fertilizers at farm level in the past decade. However, many technical problems remain with regard to the quantity and quality of the organic resources available.  Quantity of livestock manure is insufficient because of lower animal number with regard to the extensive farming system and free grazing feeding system. With the emergence of mixed farms, crop–livestock interactions on individual farms amplify at the expense of the interactions of separate crop and livestock farms. Less manure becomes available from (agro) pastoralists whose own needs are increasing in response to their expanding cropping activities. Crop farmers are thus faced with the need of acquiring livestock or purchasing more chemical fertilizers for maintaining soil fertility of their fields (Diarisso et al. 2015). Obviously, livestock stocking rates that would provide enough manure to fertilize all fields of a farm, whilst depending on crop residue utilization from the same farm for feeding are not realistically attainable in the study area. Low biomass production is major constraint for higher stocking rates on farms. Meanwhile cotton biomass is mainly burnt in the study area and does not contribute to soil fertility enhancement or to livestock feeding. Promising alternative would be to identify technical options for valorization of cotton stem, thus leading to diversifying source of biomass for composting. Possibilities exist to increase manure-use efficiency within the constraints in which smallholder farmers operate (Harris 2002). | | | | | | | | | | | | | | |
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| **2. Objectives:** Improving soil fertility management under cereal cropping system in southern Mali | | | | | | | | | | | | | | |
| 2.1 Analyzing strategies and management practices for manure production in smallholder farming system | | | | | | | | | | | | | | |
| 2.2 Improving compost quality for sustainable soil fertility management | | | | | | | | | | | | | | |
| 2.3 Improving efficiency of organic fertilizer application technique under cereal inter – cropping system | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | |
| **3. Research questions** | | | | | | | | | | | | | | |
| 3.1 What are the constraints for organic fertilizer production in smallholder farming system? How can nutrient monitoring tool be used for farm decision-making? | | | | | | | | | | | | | | |
| 3.2 What are the main constraints for composting? How can cotton stem be used as source of diversification for composting in southern Mali? How can composting method improve quality and therefore improve soil fertility? | | | | | | | | | | | | | | |
| 3.3 How canorganic fertilizer application technique improve crop production and soil fertility? How to improve manure application efficiency? | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | |
| **4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc).** | | | | | | | | | | | | | | |
| 4.1 Analyzing biomass flow for soil fertility management  Our approach is based on diagnosis and analysis of existing farming system and nutrient management. Farm monitoring, will take place at plot and farm household level, because most of the decisions concerning biomass and nutrient management are taken at that level. Infuences of processes at lower scales and higher scales will be studied as well and incorporated in the farm level approach.  Information will be collected through survey and measuring and will be based on field status, soil type, localization, field-village distance, crop type, previous crop, total area cultivated in market gardens, total area cultivated in off-season, land reserves policy and Fallow, date and quantity for crop residues collection, crop yield, farm operation, animal draft, manure application, permanent and wage temporaly, migration of farm members and equipment.  For livestock, information will be collected on herd structure, other livestock numbers, post-harvest pasture (field of ownership), transhumance practices, transhumance dates, guarding mode, herd feeding, other supplements, residues storage for fodder.  For understanding determinants of farmer’s management strategies and practices, we aim to obtain accurate information on farm management strategies. In-depth surveys will focus on cropping systems, livestock systems, biomass production and management, management strategies for organic and mineral fertilizer. NUTMON will be used to  Thereafter, Nutrient monitoring model will be used as a decision-support model to monitor effects of soil fertility management and address soil nutrient flows and balances, in a multi-disciplinary a farm scale. | | | | | | | | | | | | | | |
| 4.2:Our hypothesis is based on use of bio-stimulants, urea and/or natural phosphorous to improve compost quality. In the study area, cotton stems do not enter any value chain and they are generally burned after harvesting. In our composting strategy we intend to explore source of valuing cotton stems as biomass for composting under cereal based system. Following treatments will be tested: Compost 1: 1 ton of cotton stem +1 kg of bio stimulant Compost 2: 1 ton of cotton stem + 250kg of park manure Compost 3: 1tonne of cotton stem + 1kg of bio stimulant + 25kg of urea | | | | | | | | | | | | | | |
| 4.3: Use of organic fertilizer is a common practice in the study area. The practice consists of spreading 3 to 5 tons of organic fertilizer homogeneously over part or all of the field. This practice is subject of comments because of high cost of human, animal and material investment for organic fertilizer production and because of weed seed dissemination in the field. To improve efficiency of organic fertilizer and reduce effort, we will test localized application of organique fertilizer (compost) that has been produced under activity 4.2. Similar technique was applied to mineral fertilizer under cereal production in the district of Segou. Following treatment will be tested in the technology park under maize, millet or sorghum depending on farmer-desired crop. The experimental design will be Fisher Block with 4 replications.  T1 : Control practice  T2 : Farmer practice of spreading manure+ Recommended mineral fertilizer  T3 : Localized application of compost 1+ Recommended mineral fertilizer  T4 : Localized application of compost 2+ Recommended mineral fertilizer  T5 : Localized application of compost 3+ Recommended mineral fertilizer | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | |
| **5. Observation(s)** | | | | | | | | | | | | | | |
| 5.1 For understanding determinants of farmer’s management strategies and practices, we aim to obtain accurate information on farm management strategies. In-depth surveys will focus on cropping systems, livestock systems, biomass production and management, management strategies for organic and mineral fertilizers, types of organic manure (large vs small ruminants). Nutrient monitoring model will be parameterized based on results of farm survey. | | | | | | | | | | | | | | |
| 5.2: Temperatures will be recorded each day during the first 10 days and then every week until the end of composting process. The temperature will be taken out of five (05) different points on the heap and calculated an average.  Amount of water for irrigation will be recorded. Indeed, compost will be watered when drying of heap is noticed. Water is brought over the heap until starting to flow out. Number of watering cans per operation will be used as indicator for quantifying total water supplied.  Compost pH will be measured during the process especially at 7; 14; 28; 42; 56; 70 days after starting, by sampling at specified times and laboratory analysis.  For chemical characterization of the 3 types of compost; PH (1: 2.5 H2O), organic carbon (Walkley-Black), total nitrogen (Kjedhal), total phosphorus and total potassium (attack with perchloric acid, 70%) and assimilable phosphorus (Bray-I), calcium, magnesium, C / N ratio will be determined in the laboratory. The maturation time of the compost will be recorded. | | | | | | | | | | | | | | |
| 5.3:l sample: Before planting soil sample will be collected and analyzed in the laboratory to determine nutrient content such as NPK, Organic matter, CEC, Mg, Ca, pH and soil texture. In 2017 we make assumption that all soil of field are homogenous and then soil sample will be taken at different points of crop field and be mixed to constitute an average sample. Soil sample will taken from 0 to 20 cm and from 20 to 40 cm.  Weather: Weather condition will be recorded from nearby weather stations. Site location: longitude and latitude (degree); Daily maximum and minimum temperature (°C), solar radiation (MJ/m²/d), daily rainfall amount (mm); daily maximum and minimum air humidity; daily average wind speed will be recorded from nearby weather station.  Crop growth parameters: Following parameters will be measured: Planting date, emergence date, plant density, plant height, leaf area index (LAI), yield (grain and fodder). The different dates for plant height, biomass and LAI measurement will be defined ( I suggest at 10 day-intervals). Emergence date will be measured for each plot on line number 2 and the date will be chosen when there is 50% of germination. For each plot height of 5 plants will be recorded in 5 different hills at 15 days after planting and at every 15 days (30, 45, 60, 75 and 90 DAP). We count number of leave, measure length and width of these three plants. A leave is considered dead when 50% is necrosed or non-active. | | | | | | | | | | | | | | |
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| **6. Milestones** | | | | | | | | | | | | | | |
| Deliverables | | | | | Means of verification | | | | | | | Date | | |
| 6.1 Constraints for organic fertilizer production are identified  Mapping biomass flow at farm level | | | | | Report, MSc thesis | | | | | | | January, 2018 | | |
| 6.2 Promising composting technology is developed | | | | | Report, Msc thesis | | | | | | | January, 2018 | | |
| 6.3 Efficiency of application technique of compost is demonstrated | | | | | Report, MSc thesis | | | | | | | January, 2017 | | |
| **7. Sustainable intensification indicators** | | | | | | | | | | | | | | |
| 7.1 Productivity | | | Yield, Biomass, Farmer perceptions, Agricultural survey | | | | | | | | | | | |
| 7.2 Environmental | | | Soil fertility, NPK, pH, OM | | | | | | | | | | | |
| 7.3 Economic | | | Profitability, diversification of technology | | | | | | | | | | | |
| 7.4 Social | | | Ranking of technologies, Farmer perceptions, Access to production factors, Decision-making about technologies | | | | | | | | | | | |
| 7.5 Human | | | Food production (Calories/ha),  Number of new practices being tested | | | | | | | | | | | |

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| Sub-activity 1.5 | Cost-benefit analysis of alternative systems for sorghum production | | | | | | | | | | |
| Research team | | | | | | | | | | | |
| *Name* | | | | *Institution* | | | *Role* | | | | |
| Felix Badolo | | | | ICRISAT | | | Conduct economic analysis | | | | |
| Bekele Kotu | | | | IITA | | | Contribute to economic analysis | | | | |
| Birhanu Zemadim | | | | ICRISAT | | | National project manager | | | | |
|  | | | | | | | | | | | |
| e. Student(s) – None | | | | | | | | | | | |
| Name | | | Institute | | | Degree | | | Start | | End |
| 1. | | |  | | |  | | |  | |  |
| 2. | | |  | | |  | | |  | |  |
| 3. | | |  | | |  | | |  | |  |
|  |  | | | | | | | | | | |
| f. Location(s) | Bougouni and Koutiala (Mali) | | | | | | | | | | |
| g. Start | March 2017 | | | | | | | | | | |
| h. End | September 2017 | | | | | | | | | | |
|  |  | | | | | | | | | | |
| 1. Justification | | | | | | | | | | | |
| A number of technologies are being identified in biological trials in Mali. However, socio-economic information about these technologies is lacking. The study aims to evaluate selected technologies from the socio-economic point of view. | | | | | | | | | | | |
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| 2. Objectives | | | | | | | | | | | |
| 2.1 - Aim to compare and contrast these fertilizers with respects their economic advantages and production risks | | | | | | | | | | | |
| 2.2 - Given most of farmers in West Africa are concerned with cash income derived from farm product sale, this study evaluates the net returns and income risk efficiency associated to cropping treatments | | | | | | | | | | | |
| 3. Research questions | | | | | | | | | | | |
| 3.1 - Are Alternative systems for sorghum production benefit for the farmers? | | | | | | | | | | | |
| 4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc). | | | | | | | | | | | |
| 4.1 – Plot survey | | | | | | | | | | | |
| 4.2 – Cost and benefit method | | | | | | | | | | | |
| 4.3 – Stochastic dominance analysis | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 5. Data to be collected and uploaded | | | | | | | | Responsibility/Institute | | | |
| 5.1 – On-farm trials data | | | | | | | | ICRISAT | | | |
| 6. Milestones | | | | | | | | | | | |
| Deliverables | | | | | Means of verification | | | | | Date | |
| 6.1 – Cost and benefit report | | | | | Report finalized | | | | | September 2017 | |
| 6.2 – Scientific paper | | | | | Paper submitted | | | | | September 2017 | |
|  | | | | | | | | | | | |
| 7. Sustainable intensification indicators | | | | | | | | | | | |
| 7.1 Productivity | | Yields per hectare | | | | | | | | | |
| 7.2 Environmental | |  | | | | | | | | | |
| 7.3 Economic | | Net income per hectare | | | | | | | | | |
| 7.4 Social | |  | | | | | | | | | |
| 7.5 Human | |  | | | | | | | | | |

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| Sub-activity 1.6 | Scaling out climate information services (CIS) use through the Participatory Integrated Climate Services for Agriculture (PICSA) approach to developing Climate-Smart Villages (CSV) in the Africa rising site of Bougouni in Mali | | | | | | | | | | |
| Research team | | | | | | | | | | | |
| *Name* | | | | *Institution* | | | *Role* | | | | |
| *Mathieu Ouedraogo* | | | | *ICRISAT/CCAFS* | | | *Coordinating the activity* | | | | |
| *Samuel T Partey* | | | | *CCAFS/ICRISAT* | | | *Evolving in famers practices assessment* | | | | |
| *Robert Zougmoré* | | | | *CCAFS/ICRISAT* | | | *Technical support to the team* | | | | |
| *Bouba Traoré* | | | | *ICRISAT* | | | *Evolving in PICSA training* | | | | |
|  | | | | | | | | | | | |
| e. Student(s) | | | | | | | | | | | |
| Name | | | Institute | | | Degree | | | Start | | End |
| 1. None | | |  | | |  | | |  | |  |
| 2. | | |  | | |  | | |  | |  |
| 3. | | |  | | |  | | |  | |  |
|  |  | | | | | | | | | | |
| Location(s) | Bougouni | | | | | | | | | | |
| tart | March 2017 | | | | | | | | | | |
| End | December 2017 | | | | | | | | | | |
| Justification | | | | | | | | | | | |
| West Africa is known to be particularly vulnerable to climate change due to high climate variability and high reliance on rain-fed agriculture. Promotion of climate smart agricultural (CSA) practices remains a global developmental agenda and one mainstream opportunity to mitigate climate change and sustain the productivity of agricultural systems. Considering this need, the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) has developed the Climate-Smart Village (CSV) approach as a means to agricultural research for development (AR4D) in the context of climate change. It is an approach where CCAFS in partnership with rural communities and other stakeholders (NARES, NGOs, local authorities), tests & validates in an integrated manner, several agricultural interventions that will be brought to scale. The CSV approach is founded on the principles of participatory action research for grounding research on appropriate and location/context-specific enabling conditions, generating greater evidence of CSA effectiveness in a real-life setting and facilitating co-development of scaling mechanisms towards landscapes, subnational and national levels. The CSV approach has six components - (1) CSA practices and technologies, (2) climate information services and insurance, (3) local and national public and private institutions, (4) national and subnational plans and policies, (5) farmers’ knowledge and (6) climate and ag-development finance. Each of the components mobilizes specific partners including research team, met services and local authorities and development partners. The component related to CIS uses several approaches including the Participatory Integrated Climate Services for Agriculture (PICSA) approach which aims to facilitate farmers to make informed decisions based on accurate, location specific, climate and weather information; locally relevant crop, livestock and livelihood options; and with the use of participatory tools to aid their decision making.  Since 2011, CCAFS has been using the CSV approach in West Africa (Ghana, Senegal, Mali, Niger and Burkina Faso) to test and validate several agricultural interventions with the participation of various local partners. In Mali, substantial successes have been achieved over the past 4 years where through the CSV, climate information was used as an entry point for informing the choice of CSA technologies that have contributed to improved farm productivity and building resilient livelihoods for poor and marginal farmers.  In view of the priorities of Africa Rising, CCAFS will use its experiences in promoting and disseminating integrated crop-livestock-soil systems based on local climate variability for sustained productivity and reduced risk in the intervention communities. The implementation of this activity is expected to contribute to Outcome 1 of the Africa Rising phase II project: “Farmers and farming communities in the project area are practicing more productive, resilient, profitable and sustainably intensified crop-livestock systems linked to markets”. | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 2. Objectives | | | | | | | | | | | |
| 2.1 Promote the use of climate information services as a basis for farm management decisions | | | | | | | | | | | |
| 2.2 Promote the adoption of integrated crop-livestock-soil systems based on local needs for improved adaptive capacity to climate change and variability | | | | | | | | | | | |
| 3. Research questions | | | | | | | | | | | |
| 3.1 How does provision and use of climate information services relate to farm productivity and livelihoods of smallholder farm communities based on choice of climate-smart crop varieties, livestock breeds, fodder species and agronomic and animal husbandry practices? | | | | | | | | | | | |
| 4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc). | | | | | | | | | | | |
| 4.1 Training of famers and extension services agents in PICSA approach | | | | | | | | | | | |
| 4.2 Monitoring and evaluation of the use of PICSA approach by farmers | | | | | | | | | | | |
| 5. Data to be collected and uploaded | | | | | | | | Responsibility/Institute | | | |
| 5.1 Historic weather information will be collected throughout the study | | | | | | | | CCAFS | | | |
| 5.2 Farmers perceptions on climate variability and farmers practices | | | | | | | | CCAFS | | | |
| 5.3 Farmers practice changes due to the use of PICSA | | | | | | | | CCAFS | | | |
|  | | | | | | | | | | | |
| 6. Milestones | | | | | | | | | | | |
| Deliverables | | | | | Means of verification | | | | | Date | |
| 6.1. Farmers and extension agents trained in PICSA approach | | | | | Training workshop report | | | | | December 2017 | |
| 6.2. Farmers received climate information through the climate forecast communication workshop | | | | | Activity report | | | | | From May –November 2017 | |
|  | | | | | | | | | | | |
| 7. Sustainable intensification indicators | | | | | | | | | | | |
| 7.1 Productivity | | Yield | | | | | | | | | |
| 7.2 Environmental | |  | | | | | | | | | |
| 7.3 Economic | | Profitability, Income diversification, | | | | | | | | | |
| 7.4 Social | |  | | | | | | | | | |
| 7.5 Human | |  | | | | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **8. Budget (US$)** |  |  |  |  |
| Outcome/Output/Activity | Sub-activity | Budget Line | ICRISAT | WorldVeg |
| Outcome 1/Output 1/Activity 1 | 1.1 | Personnel |  |  |
|  |  | Services |  |  |
|  |  | Supplies |  |  |
|  |  | Capital |  |  |
|  |  | Travel |  |  |
|  |  | Overhead |  |  |
|  |  | Total |  | 10000 |
| Outcome 1/Output 1/Activity 1 | 1.2 | Personnel |  |  |
|  |  | Services |  |  |
|  |  | Supplies |  |  |
|  |  | Capital |  |  |
|  |  | Travel |  |  |
|  |  | Overhead | 1187 |  |
|  |  | Total | 11870 |  |
| Outcome 1/Output 1/Activity 1 | 1.3 | Personnel |  |  |
|  |  | Services |  |  |
|  |  | Supplies |  |  |
|  |  | Capital |  |  |
|  |  | Travel |  |  |
|  |  | Overhead | 2805 |  |
|  |  | Total | 17805 |  |
| Outcome 1/Output 1/Activity 1 | 1.4 | Personnel |  |  |
|  |  | Services |  |  |
|  |  | Supplies |  |  |
|  |  | Capital |  |  |
|  |  | Travel |  |  |
|  |  | Overhead | 3740 |  |
|  |  | Total | 23740 |  |
| Outcome 1/Output 1/Activity 1 | 1.5 | Personnel |  |  |
|  |  | Services |  |  |
|  |  | Supplies |  |  |
|  |  | Capital |  |  |
|  |  | Travel |  |  |
|  |  | Overhead | 1870 |  |
|  |  | Total | 11870 |  |
| Outcome 1/Output 1/Activity 1 | 1.6 | Personnel |  |  |
|  |  | Services |  |  |
|  |  | Supplies |  |  |
|  |  | Capital |  |  |
|  |  | Travel |  |  |
|  |  | Overhead | 3740 |  |
|  |  | Total | 23740 |  |

**Activity 2: Test and disseminate a combination of improved breeds, housing, feeding, health and breeding practices to intensify rearing of livestock (sheep, goat, pig, and poultry) for meat, egg and milk production.**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sub-activity 2.1 | Feed-health interventions for improved small ruminant production | | | | | | | | | | |
| Research team | | | | | | | | | | | |
| Name | | | | Institution | | | Role | | | | |
| Augustine Ayantunde | | | | ILRI | | | Sub-activity leader (design, data analysis and reporting) | | | | |
| Siaka Coulibaly | | | | AMEDD | | | Monitoring | | | | |
| Seydou Koita | | | | AMEDD | | | Monitoring and data collection | | | | |
|  | | | | | | | | | | | |
| Student(s) | | | | | | | | | | | |
| Name | | | Institute | | | Degree | | | Start | | End |
| 1. | | |  | | |  | | |  | |  |
| 2. | | |  | | |  | | |  | |  |
| 3. | | |  | | |  | | |  | |  |
|  |  | | | | | | | | | | |
| f. Location(s) | Sirakele and Zanzoni (Koutiala) | | | | | | | | | | |
| g. Start | April 2017 | | | | | | | | | | |
| h. End | February 2018 | | | | | | | | | | |
| 1. Justification | | | | | | | | | | | |
| It has been demonstrated that simple interventions such as health, supplementary feeding and good housing have significant positive effect on performance and productivity of small ruminants. Building on results of feed-health interventions for improved small ruminant production in Africa RISING intervention communities in Mali, this study is designed to improve sheep and goat production in two intervention communities in Koutiala. This is a pilot study in Sirakele and Zanzoni which started in August 2016. There are 2 treatments – control (farmers’ practice) and feed-health intervention. The health treatment includes vaccination against PPR and pasteurollosis, deworming and antibiotic treatment along with supplementary feeding. This study is a continuation of the pilot study which started in August 2016 to complete data collection. | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 2. Objectives | | | | | | | | | | | |
| 2.1 To test feed-health intervention for improved small ruminant production in Koutiala and to assess benefit and cost. | | | | | | | | | | | |
| 3. Research questions | | | | | | | | | | | |
| 3.1What are the effects of feed and health interventions on small ruminant performance? What are the cost and benefit of these interventions? | | | | | | | | | | | |
| 3.2 How does improved small ruminant production practices impact on livelihood of the smallholder crop-livestock farmers? | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc). | | | | | | | | | | | |
| 4.1 Twenty farmers are selected in each community, and their sheep and goats are being monitored. The feed-health intervention is applied to Sirakele while twenty Zanzoni serves as control. The farmers selected have at least 6 sheep and goats. A livestock technician is responsible for the data collection on monthly weight changes, manure production and flock dynamic (birth, death, purchase, sale, animal given as gift, animal consumed etc.). The cost benefit analysis will be conducted to assess the profitability of the feed-health intervention. The management practices of the selected households will be documented by sex. The State Veterinary services will be responsible for the application of the health intervention including vaccination of the sheep and goats in Sirakele. The experimental farmers in the study will be trained in improved small ruminant production practices. | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 5. Data to be collected and uploaded | | | | | | | | Responsibility/Institute | | | |
| 5.1 Weight data of experimental animals in Sirakele and Zanzoni | | | | | | | | Augustine Ayantunde / ILRI | | | |
| 5.2 | | | | | | | |  | | | |
| 5.3 | | | | | | | |  | | | |
|  | | | | | | | | | | | |
| 6. Milestones | | | | | | | | | | | |
| Deliverables | | | | | Means of verification | | | | | Date | |
| 6.1 Report of the study | | | | | Report | | | | | February 2018 | |
| 6.2 Weight development data | | | | | Data uploaded on CKAN | | | | | April 2018 | |
|  | | | | | | | | | | | |
| 7. Sustainable intensification indicators | | | | | | | | | | | |
| 7.1 Productivity | | Average daily gain of experimental animals | | | | | | | | | |
| 7.2 Environmental | | Quality of animal manure | | | | | | | | | |
| 7.3 Economic | | Cost benefit of feed-health intervention | | | | | | | | | |
| 7.4 Social | |  | | | | | | | | | |
| 7.5 Human | |  | | | | | | | | | |
|  | | | | | | | | | | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sub-activity 2.2: | | Test and disseminate poor forage upgrading techniques to enhance livestock feeding during the dry season | | | | | | | | | |
| Research team | | | | | | | | | | | |
| Name | | | | | Institution | | Role | | | | |
| Hamidou NANTOUME | | | | | IER | | Leader of the sub activity | | | | |
| Patner to be identified | | | | |  | |  | | | | |
|  | | | | | | | | | | | |
| Student(s) | | | | | | | | | | | |
| Name | | | | Institute | | Degree | | | Start | End | |
| TBI | | | | ISFRA/USTTB | | PhD | | |  |  | |
| f. Location(s) | Koutiala and Bougouni | | | | | | | | | | |
| g. Start | March | | | | | | | | | | |
| h. End | December | | | | | | | | | | |
|  |  | | | | | | | | | | |
| 1. Justification | | | | | | | | | | | |
| The ability of animals to grow, develop, reproduce and produce meat, milk and power is influenced by how much they get to eat and the quality of what they eat. If they don’t get adequate nutrition, all these functions slow down or cease.  Providing adequate feed for animals the year round can be a problem in Mali. There is plenty of good natural feed during the rainy season when quality and quantity of forages are best, but not enough feed during the longer period of the dry season characterized with a scarcity and lower quality of feed. To provide the extra and appropriate feed needed to cover the animal demands during the dry season several techniques can be used. The most important are silage making, hay making, chopping (physical treatment) and urea treatment of forages. Most of these technologies are not new but their adoption rates appear relatively low. | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 2. Objectives  To dissiminate forrage upgrading technologies for optimum and efficient utilization of poor forages to enhance livestock feeding during the dry season trough training and demonstration. The specific objectives are to master the techniques of : | | | | | | | | | | | |
| 2.1. How to make a good silage | | | | | | | | | | | |
| 2.2. How to make a good hay | | | | | | | | | | | |
| 2.3. How to do physical treatment of forages using choppers | | | | | | | | | | | |
| 2.4. How to do chemical treatment of forages using urea. | | | | | | | | | | | |
| 3. Research questions | | | | | | | | | | | |
| 3.1. Are there techniques for upgrading poor forages necessary to be known by farmers for better feeding livestock during the dry season? | | | | | | | | | | | |
| 4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc). | | | | | | | | | | | |
| 4.1. First of all, a survey will be conducted to know more about feed availability and quality and the related problems of feeding livestock during the dry season. This will help in determining how and where the problem is the most important. The survey will be done using the sheets in Annex1.  Then, training and demonstration on how to upgrade poor forages will be conducted to farmers for enhancing livestock feeding during the dry season in the areas of Koutiala and Bougouni where the Africa RISING project has been implemented. The poor forages of interest are the plants and residues of the most cultivated cereals (maize and sorghum), and, a natural grass (Pennisetum pedicellatum). Two main processes will be used to 1) preserve the excess forage of the raining season when its quality and quantity is best through silage making and hay making and to 2) treat the dry forage through chopping (physical treatment) or urea treatment (chemical treatment). Therefore, silage making, hay making, chopping and urea treatment are the technologies that will be applied to the three poor forages. Training and demonstration to the technologies will be done to farmers organized as IP (innovation platform) around the subject “Upgrading poor forage to enhance livestock feeding during the dry season” using the IAR4D (integrated agricultural research for development) principles.  The Technology parks that are a suitable means for technology validation, awareness creation, farmer capacity building are also used as important meeting points, where researchers and farmers work together. Therefore, they will be the ideal places for farmers field days and where the technologies (silage making, hay making, chopping and urea treatment) will be demonstrated. To do so, availability of plant materials on which the technologies will be applied, harvesting tools, chopping machines, storage structure (silo), etc. at the sites (technologies parks) is necessary.  The participating villages and farmers will be chosen in the two Africa RISING areas, Koutiala and Bougouni in collaboration with the two site coordinators. Twenty villages (10 in each area) will be chosen based on the importance of livestock population and the conducted survey. For the area of Koutiala, 6 villages will be added to the four villages that are Mpessoba, Zansoni, Sirakélé and Nampossela. Six villages will be added to the former 4 villages (Flola, Sibirila, Madina and Diéba) of the area of Bougouni to obtain 10 villages.  Two participating farmers (a man and a woman) will be chosen from each of the 20 villages. The overall sample size will be 40 for the two areas of Koutiala and Bougouni. The sample of participants will include several stakeholders such as farmer organization, feed business persons, NGOs members, animal husbandry department, etc., organized as innovation platforms for each area. | | | | | | | | | | | |
| 4.2. Pennisetum pedicellatum one of the most common natural grass will be used to make good silage. The plant will be cut in late August September at the stage of heading flower, chopped and ensiled using a square silo of 1m3 (1 m of height and 1 m of sides) built in each technology parks of Koutiala and Bougouni. All the steps of a good silage making (cutting, wilting if necessary, chopping and storing) will be conducted with the participation of the 40 collaborating farmers. The silo will be opened during the dry season and used to feed sheep as needed. Silage samples will be taken from each silo for lab analyses. | | | | | | | | | | | |
| 4.3. In late September or early October, a natural grass (Pennisetum pedicellatum) will be cut just before flower for making good hay. To do so, all the recommendations of producing quality hay, storage and handling and, use of harvesting tools will be applied. Samples of the hay will be compared with the standing Pennisetum pedicellatum hay using lab analyses. | | | | | | | | | | | |
| 4.4. In Bougouni, like in Koutiala, after harvesting, residues of maize and sorghum will be collected and stored for later use. In March, the two crop residues and a collected natural grass (Pennisetum pedicellatum) will be chopped using two different types of choppers in each area of study. The characteristics of the 2 types of chopper will be compared. Samples of the chopped grass will be taken for lab analyses. | | | | | | | | | | | |
| 4.5. All the three chopped forages could be treated with urea but to reduce the cost, only maize stovers and bush hay (P. pedicellatum) will be treated with urea at 5% on DM basis for feeding sheep later on (April). Samples taken from the treated and untreated forages (maize and P. pedicellatum) will be analyzed for chemical composition. | | | | | | | | | | | |
| 4.6. All the feed samples taken (green plants, silages, hay, non treated crop residues, urea treated residues) will be analyzed for dry matter, crude protein, ash, crude fat, crude fiber, gross energy, calcium and phosphorus at the animal nutrition lab. | | | | | | | | | | | |
| 4.7. Statistical analyses will be performed on the collected data using appropriate experimental design. Performances of the 2 types of choppers will be compared using price of the equipment, energy source, power, maintenance requirements, output, fuel consumption, etc..outputs of the 3 types of forages. Chemical composition of the 3 silages, 3 green forages, 3 untreated dry forages and 3 urea treated forages will be compared. | | | | | | | | | | | |
| 5. Data to be collected and uploaded | | | | | | | | Responsibility/Institute | | | |
| 5.1. Quantity (kg) and quality (lab analyses) of silage made | | | | | | | |  | | | |
| 5.2. Quality (kg) and quality (lab analyses) of hay made | | | | | | | |  | | | |
| 5.3. Quantity (kg), quality (lab analyses) of chopped forages (green and dry) and urea treated forages | | | | | | | |  | | | |
| 5.4. Efficiency of the types of choppers | | | | | | | |  | | | |
|  | | | | | | | | | | | |
| 6. Milestones:  Diagnosis on farmer training/demonstration needs done by April; Farmers are trained and benefited to demonstration on: silage making in August-September hay making in September October, chopping in April urea treatment in March 2018. | | | | | | | | | | | |
| Deliverables | | | | | | Means of verification | | | | | Date |
| 6.1. Diagnosis on training needs | | | | | | Reports, field visits | | | | | April |
| 6.2. Training and demonstration on silage making | | | | | | Reports, field visits | | | | | September |
| 6.3. Training and demonstration on hay making | | | | | | Reports, field visits | | | | | October |
| 6.4. Training and demonstration on chopping | | | | | | Reports, field visits | | | | | April 2018 |
| 6.5. Training and demonstration on urea treatment | | | | | | Reports, field visits | | | | | March 2018 |
|  | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 7. Sustainable intensification indicators | | | | | | | | | | | |
| 7.1 Productivity | | | Crop (sorghum, millet), residues (sorghum, millet) production | | | | | | | | |
| 7.2 Environmental | | |  | | | | | | | | |
| 7.3 Economic | | | Input use intensity, profitability, labor requirement | | | | | | | | |
| 7.4 Social | | | Collective action | | | | | | | | |
| 7.5 Human | | | Capacity to experiment | | | | | | | | |
|  | | | | | | | | | | | |

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| Sub-activity 2.3. | | Sheep fattening to reduce poverty and food insecurity for women farmers | | | | | | | | | |
| Research team | | | | | | | | | | | |
| Name | | | | Institution | | | Role | | | | |
| Hamidou NANTOUME | | | | IER | | | Leader of the sub activity | | | | |
| To be identified | | | |  | | |  | | | | |
|  | | | | | | | | | | | |
| e. Student(s) | | | | | | | | | | | |
| Name | | | Institute | | | Degree | | | Start | | End |
| 1. TBI | | | ISFRA/USTTB | | | PhD | | |  | |  |
|  |  | | | | | | | | | | |
| Location(s) | Bougouni and Koutiala | | | | | | | | | | |
| Start | March 2017 | | | | | | | | | | |
| End | December 2017 | | | | | | | | | | |
|  |  | | | | | | | | | | |
| 1. Justification | | | | | | | | | | | |
| In Mali livestock are estimated to 10 622 750 cattle, 15 143 415 sheep and 21 087 300 goats (DNPIA 2016) and contribute to 17% of the gross national product.  Livestock play an important role in social activities and in the supply of animal products (meat and milk). Moreover sheep and goats provide an additional income source to low-capital family farms. The daily meat consumption per inhabitant that is estimated at 12 kg was supposed to increase to 21 kg in 1991 according to the five years plan of 1987-1991. Food insecurity that results is shown not only as food deficit but as a non balanced nutrition in food requirements in most of the urban and rural populations of Mali.  Sheep fattening is becoming very common and practiced without any gender restriction both in the large and small villages especially during the religious feasts. The rations fed, the length of the fattening period, the age and breeds used and other techniques (vaccination, deworming) made the profits gained very diverse. Average daily gains of 50 to 200 g and net profit from 11 000 to 33 300 F.CFA were obtaining depending on the fattening conditions and the breeds used. | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 2. Objectives  The general objective of this study is to improve the production of good quality sheep meat and the producers’ income that will contribute to reduce poverty and food insecurity. The specific objectives are: | | | | | | | | | | | |
| 2.1. To improve production of good quality sheep meat | | | | | | | | | | | |
| 2.2. Determine and disseminate appropriate sheep fattening rations | | | | | | | | | | | |
| 3. Research questions  How does sheep fattening reduce poverty and food insecurity? | | | | | | | | | | | |
| 4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc). | | | | | | | | | | | |
| 4.1. Fattening tests will be conducted for three months (2 weeks of adaption period) at the technology parks with an active participation of the beneficiaries who are women from the previously selected twenty villages and organized in innovative platforms. The fattening tests will be conducted in each area to compare four rations containing each 40% of cottonseed cake and 60% forage. The forage part (60%) of the rations will be 1) natural grass (P. pedicellatum) silage, 2) natural grass (P. pedicellatum) hay, 3) urea treated natural dry grass (P. pedicellatum) and 4) urea treated maize straw. Using a number of 5 heads per treatment or ration, the number of sheep needed in each area will be 20 (5 sheep x 4 rations). The total number of sheep is evaluated at 40 (20 in each area). | | | | | | | | | | | |
| 4.2. Forty, 12-18 month old sheep (2 adult pairs of teeth) will be bought, then vaccinated against peste des petits ruminants (PPR) and pasteurrolosis and dewormed against external, internal and blood parasites using Ivermectine, Fenbendazole and Berenyl. They will be adapted to the environmental conditions for two weeks and tested for 75 days. Feed intake and weight gain will be recorded through weighing feeds, orts on daily basis and animals at the beginning and at the end of the experiment. Feed samples will be taken to determine the chemical composition of the rations. Costs of all the inputs and outputs will be recorded to do the economic analyses of the fattening operations. | | | | | | | | | | | |
| 4.3. Data analyses will be performed on feed intake, weight gain, feed efficiency and cost benefit to determine the best ration using the completely randomized design (CRD) of SAS (SAS Enterprise Guide, 2013) . | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 5. Data to be collected and uploaded | | | | | | | | Responsibility/Institute | | | |
| 5.1. Weight changes of the animals | | | | | | | |  | | | |
| 5.2. Feed intake | | | | | | | |  | | | |
| 5.3. Feed efficiency (weight gained/unit of feed consumption | | | | | | | |  | | | |
| 5.3. costs of inputs and outputs | | | | | | | | | | | |
| 6. Milestones  Choice of collaborative farmers in March, test of fattening rations and data collected from March to May, reporting in July | | | | | | | | | | | |
| Deliverables | | | | | Means of verification | | | | | Date | |
| 6.1. Collaborative farmers known | | | | | Field visit, reports | | | | | April 2017 | |
| 6.2. Sheep are fattened | | | | | Field visit, reports | | | | | May 2017 | |
| 6.3. Reports are available | | | | | Field visit, reports | | | | | July 2017 | |
|  | | | | | | | | | | | |
| 7. Sustainable intensification indicators | | | | | | | | | | | |
| 7.1 Productivity | | Animal production, input use efficiency | | | | | | | | | |
| 7.2 Environmental | | soil nutrients | | | | | | | | | |
| 7.3 Economic | | Profitability, income diversification, market orientation, poverty | | | | | | | | | |
| 7.4 Social | | gender equity | | | | | | | | | |
| 7.5 Human | | food security, nutrition | | | | | | | | | |
|  | | | | | | | | | | | |

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| --- | --- | --- | --- | --- |
| **8. Budget (US$)** |  |  |  |  |
| Outcome/Output/Activity | Sub-activity | Budget Line | ILRI | IER |
| Outcome 1/Output 1/Activity 2 | 2.1 | Personnel |  |  |
|  |  | Services |  |  |
|  |  | Supplies |  |  |
|  |  | Capital |  |  |
|  |  | Travel |  |  |
|  |  | Overhead | 11220 |  |
|  |  | Total | 71220 |  |
| Outcome 1/Output 1/Activity 2 | 2.2 | Personnel |  |  |
|  |  | Services |  |  |
|  |  | Supplies |  |  |
|  |  | Capital |  |  |
|  |  | Travel |  |  |
|  |  | Overhead |  | 1870 |
|  |  | Total |  | 11870 |
| Outcome 1/Output 1/Activity 2 | 2.3 | Personnel |  |  |
|  |  | Services |  |  |
|  |  | Supplies |  |  |
|  |  | Capital |  |  |
|  |  | Travel |  |  |
|  |  | Overhead |  | 2805 |
|  |  | Total |  | 17805 |

**Activity 3: Test and disseminate integrated crop-livestock-soil systems to increase and sustain productivity and reduce risk.**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sub-activity 3.1 | Multi-criteria assessment and trade-off analysis of tested options at farm level, leading to options that are tailored to farmer contexts. | | | | | | | | | | |
| d. Research team | | | | | | | | | | | |
| *Name* | | | | *Institution* | | | *Role* | | | | |
| *Katrien Descheemaeker* | | | | *Wageningen University* | | | *Activity leader – student supervisor* | | | | |
| *Jeroen Groot* | | | | *Wageningen University* | | | *Activity co-leader* | | | | |
| *Ken Giller* | | | | *Wageningen University* | | | *Student supervisor* | | | | |
| *Bouba Traoré* | | | | *ICRISAT* | | | *Collaborator* | | | | |
|  | | | | | | | | | | | |
| e. Student(s) | | | | | | | | | | | |
| Name | | | Institute | | | Degree | | | Start | | End |
| 1.Eva Huet | | | *Wageningen University* | | | PhD student | | | 1/12/2016 | | 1/12/2020 |
| 2. | | |  | | |  | | |  | |  |
| 3. | | |  | | |  | | |  | |  |
|  |  | | | | | | | | | | |
| f. Location(s) | Koutiala, Mali | | | | | | | | | | |
| g. Start | July 2017 | | | | | | | | | | |
| h. End | February 2018 | | | | | | | | | | |
|  |  | | | | | | | | | | |
| 1. Justification | | | | | | | | | | | |
| Different crop-livestock intensification options and technologies have been tested in the Africa RISING project and other related research for development projects in the region. Hence, information and data is available on the effects of these options on different farm components. However, an integrated analysis at farm level, comparing the effects according to different criteria is still lacking. This activity seeks to synthesize and compile the existing information by taking into account a range of criteria and indicators that are relevant for sustainable intensification. This is important because adoption decisions by farmers depend on a wide range of performance criteria that go beyond farm productivity. Understanding farmers’ perception of these criteria is key in assessing farmer decision making and will help Africa RISING researchers to design tailored interventions. | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 2. Objectives | | | | | | | | | | | |
| 2.1 To quantify the effects of previously tested crop-livestock intensification options on a range of sustainability indicators, including productivity, food self-sufficiency, nutritional value of the diet, income, and soil fertility | | | | | | | | | | | |
| 2.2. To inform farmers, as well as extension and development actors in the Koutiala area about the effects and about the recommendation domains for tested options | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 3. Research questions | | | | | | | | | | | |
| 3.1 What are the effects of previously tested crop-livestock intensification options on a range of sustainable intensification indicators, including productivity, food self-sufficiency, and nutritional value of the diet, income, and soil fertility? | | | | | | | | | | | |
| 3.2 What are the trade-offs and synergies between different domains of sustainable intensification if these options are applied? | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc). | | | | | | | | | | | |
| 4.1. Collection of information and data from Africa RISING and other projects’ experiments and other sources | | | | | | | | | | | |
| 4.2. Whole-farm model simulations with FARMSIM | | | | | | | | | | | |
| 4.3. Male, female and young farmers will participate in a farmer workshop | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 5. Data to be collected and uploaded | | | | | | | | Responsibility/Institute | | | |
| 5.1. This activity intends to use the existing data within the project | | | | | | | |  | | | |
| 5.2. Simulation results on crop and livestock productivity, soil fertility | | | | | | | | Wageningen University | | | |
| 5.3 | | | | | | | |  | | | |
|  | | | | | | | | | | | |
| 6. Milestones | | | | | | | | | | | |
| Deliverables | | | | | Means of verification | | | | | Date | |
| 6.1. PhD proposal | | | | | Proposal submitted | | | | | 1 July 2017 | |
| 6.2. FARMSIM model tested | | | | | report | | | | | 1 December 2017 | |
| 6.3. multi-criteria assessment completed | | | | | report | | | | | 1 February 2018 | |
|  | | | | | | | | | | | |
| 7. Sustainable intensification indicators | | | | | | | | | | | |
| 7.1 Productivity | | Crop yield per hectare, animal productivity (e.g. kg of milk per animal; number of animals sold - per animal and per farm) | | | | | | | | | |
| 7.2 Environmental | | Soil organic carbon content | | | | | | | | | |
| 7.3 Economic | | Gross margin | | | | | | | | | |
| 7.4 Social | |  | | | | | | | | | |
| 7.5 Human | | Food self-sufficiency, dietary diversity | | | | | | | | | |
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| Sub-activity 3.2 | Assess value chain constraints and opportunities for male, female and young farmers in the Koutiala area | | | | | | | | | | |
| Research team | | | | | | | | | | | |
| *Name* | | | | *Institution* | | | *Role* | | | | |
| *Katrien Descheemaeker* | | | | *Wageningen University* | | | *Activity leader – student supervisor* | | | | |
| *Jeroen Groot* | | | | *Wageningen University* | | | *Activity co-leader* | | | | |
| *Ken Giller* | | | | *Wageningen University* | | | *Student supervisor* | | | | |
| *Arouna Bayoko* | | | | *AMEDD* | | | *Collaborator* | | | | |
|  | | | | | | | | | | | |
| e. Student(s) | | | | | | | | | | | |
| Name | | | Institute | | | Degree | | | Start | | End |
| 1. Arouna Dissa | | | *IER & Wageningen University* | | | PhD student | | | 1/1/2017 | | 31/12/2020 |
| 2. | | |  | | |  | | |  | |  |
| 3. | | |  | | |  | | |  | |  |
|  |  | | | | | | | | | | |
| f. Location(s) | Koutiala, Mali | | | | | | | | | | |
| g. Start | July 2017 | | | | | | | | | | |
| h. End | February 2018 | | | | | | | | | | |
|  |  | | | | | | | | | | |
| 1. Justification | | | | | | | | | | | |
| Adoption of sustainable intensification options is often constrained by limited access to markets. Different actors in the value chain run considerable risk and do not make use of the existing potential due to limited interactions and insufficient trust between them. To design better functioning value chains, in which male, female and young farmers can achieve the potential of sustainable intensification, a first step is a better understanding of how current value chains function, and where the major constraints and opportunities are. | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 2. Objectives | | | | | | | | | | | |
| 2.1 To understand the functioning of value chains in the Koutiala area, including the various actors and the interactions between the latter | | | | | | | | | | | |
| 2.2 To diagnose transaction costs at various points in the value chains | | | | | | | | | | | |
| 3. Research questions | | | | | | | | | | | |
| 3.1 What are the major constraints and opportunities for male, female and young smallholder farmers in terms of accessing and benefiting from value chains in the Koutiala area | | | | | | | | | | | |
| 4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc). | | | | | | | | | | | |
| 4.1. Survey of actors in at least three relevant value chains in the Koutiala area | | | | | | | | | | | |
| 4.2. Inclusion of male, female and young farmers as producers in the value chain analysis | | | | | | | | | | | |
| 4.3. Transaction costs analysis and social network analysis | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 5. Data to be collected and uploaded | | | | | | | | Responsibility/Institute | | | |
| 5.1. Commodity prices | | | | | | | | Wageningen University | | | |
| 5.2. Investments, revenues, profits realized by different value chain actors | | | | | | | | Wageningen University | | | |
| 5.3. Nature and frequency of interactions between value chain actors | | | | | | | | Wageningen University | | | |
|  | | | | | | | | | | | |
| 6. Milestones | | | | | | | | | | | |
| Deliverables | | | | | Means of verification | | | | | Date | |
| 6.1. PhD proposal | | | | | Proposal submitted | | | | | 1 July 2017 | |
| 6.2. Inventory of actors and institutions | | | | | report | | | | | 1 December 2017 | |
| 6.3. Value chain assessment | | | | | report | | | | | 1 February 2018 | |
|  | | | | | | | | | | | |
| 7. Sustainable intensification indicators | | | | | | | | | | | |
| 7.1 Productivity | |  | | | | | | | | | |
| 7.2 Environmental | |  | | | | | | | | | |
| 7.3 Economic | | % of income coming from agriculture. % of production sold, % of land under cash crops | | | | | | | | | |
| 7.4 Social | | number of households participating in cooperative marketing | | | | | | | | | |
| 7.5 Human | |  | | | | | | | | | |

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| **8. Budget (US$)** |  |  |  |  |
| Outcome/Output/Activity | Sub-activity | Budget Line | WUR |  |
| Outcome 1/Output 1/Activity 3 | 3.1 | Personnel |  |  |
|  |  | Services |  |  |
|  |  | Supplies |  |  |
|  |  | Capital |  |  |
|  |  | Travel |  |  |
|  |  | Overhead |  |  |
|  |  | Total | 1402 |  |
| Outcome 1/Output 1/Activity 3 | 3.2 | Personnel | 8902 |  |
|  |  | Services |  |  |
|  |  | Supplies |  |  |
|  |  | Capital |  |  |
|  |  | Travel |  |  |
|  |  | Overhead | 1402 |  |
|  |  | Total | 8902 |  |

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| **Output 2: Integrated management technologies and practices to improve and sustain productivity and ecosystems services of the soil, land, water and vegetation resources are developed and disseminated with farmers and development partners in the intervention communities.** |

**Activity 1: Test and disseminate land, soil and integrated land-soil technologies and practices to improve and sustain productivity and ecosystems services at the farm and landscape/watershed levels.**

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| Sub-activity 1.1 | Investigate the impact of land and water management practices overtime on the productivity and economic benefits on cereal crops (sorghum, millet and maize) in different agro-ecologies | | | | | | | | | | |
| Research team | | | | | | | | | | | |
| *Name* | | | | *Institution* | | | *Role* | | | | |
| Birhanu Zemadim | | | | ICRISAT | | | Leader, Land and Water Management | | | | |
| Ramadjita Tabo | | | | ICRISAT | | | Agronomist | | | | |
| Felix Badolo | | | | ICRISAT | | | Economist | | | | |
| Mahamadou Dicko | | | | ICRISAT | | | Bougouni Site coordinator | | | | |
| Karamoko Traore | | | | ICRISAT | | | Koutiala Site coordinator | | | | |
| Oumar Samake | | | | AMEDD | | | Agronomist | | | | |
|  | | | | | | | | | | | |
| e. Student(s) | | | | | | | | | | | |
| Name | | | Institute | | | Degree | | | Start | | End |
| 1. | | |  | | |  | | |  | |  |
| 2. | | |  | | |  | | |  | |  |
| 3. | | |  | | |  | | |  | |  |
|  |  | | | | | | | | | | |
| f. Location(s) | Koutiala and Bougouni | | | | | | | | | | |
| g. Start | March 2017 | | | | | | | | | | |
| h. End | January 2018 | | | | | | | | | | |
|  |  | | | | | | | | | | |
| 1. Justification: Land and water management practices like that of contour bunding, drip irrigation and shallow wells have been implemented by farmers over time in southern Mali. Farmers use these practices to improve yield performance and increase the household income. There is a literature knowledge that shows implementation of contour bunding can improve cotton yield by 30% and reduce erosion rate by 30%. However there is a lack of information on the impact of contour bunding on cereal crops productivity. Cereal crops are the major staple food crops for rural Malians. In the current study the impact of land and water management practices will be evaluated on the three major staple food crops (sorghum, millet and maize) grown in the area. Data will be collected from four technology parks in Bougouni and Koutiala. | | | | | | | | | | | |
| 2. Objectives | | | | | | | | | | | |
| 2.1 Evaluate the impact of land and water management practices on the productivity of cereal crops | | | | | | | | | | | |
| 2.2 Evaluate the economic benefits of land and water management practices on major cereal production in the study area | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 3. Research questions | | | | | | | | | | | |
| 3.1 What variations exist over time on cropping performance (yield and biomass) as a result of introduced land management practices | | | | | | | | | | | |
| 3.2 What is the economic advantage of using land and water management technologies | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc). | | | | | | | | | | | |
| 4.1. Agro-ecological characterization of the different zones based on available biophysical information | | | | | | | | | | | |
| 4.2 Field experimentation to establish treatment and control fields in four technology parks with respect to improved land and water management techniques and farmers’ practice. | | | | | | | | | | | |
| 4.3 Evaluating agronomic performance and economic advantage of improved land and water management technologies | | | | | | | | | | | |
| 4.4 Evaluating available soil water content in treatment and control fields for the three cereal crops in different season to sustain plant growth and bridge the dry spell | | | | | | | | | | | |
| 5. Data to be collected and uploaded | | | | | | | | Responsibility/Institute | | | |
| 5.1 Agronomic | | | | | | | | ICRISAT | | | |
| 5.2 Soil moisture, water runoff and soil nutrient | | | | | | | | ICRISAT/IER | | | |
| 5.3 Economic, input cost, profitability | | | | | | | | ICRISAT | | | |
|  | | | | | | | | | | | |
| 6. Milestones | | | | | | | | | | | |
| Deliverables | | | | | Means of verification | | | | | Date | |
| 6.1 Data | | | | | Uploaded on CKAN | | | | | February 2018 | |
| 6.2 Report | | | | | Interim report | | | | | August 2017 | |
| 6.3 Report | | | | | Final year report | | | | | March 2018 | |
|  | | | | | | | | | | | |
| 7. Sustainable intensification indicators | | | | | | | | | | | |
| 7.1 Productivity | | Yield (Kg/ha/season), Residue production (Kg/ha/season). Variability of production (coefficient of variability) | | | | | | | | | |
| 7.2 Environmental | | Soil moisture, Infiltration rate, percentage of plants wilting, erosion (tons/ha/year), rating of erosion, soil nutrient levels, bulk density, water holding capacity | | | | | | | | | |
| 7.3 Economic | | Net income ($/crop/ha/season), Coefficient of variability of net income, probability of low profitability, Inputs per hectare, labor requirement (hours/ha), farmer rating of labor | | | | | | | | | |
| 7.4 Social | |  | | | | | | | | | |
| 7.5 Human | |  | | | | | | | | | |
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| Sub-activity 1.2 | Land ownership and Technology Adoption: Evidence from Southern Mali using IFPRI surveyed data | | | | | | | | | | |
| Research team: | | | | | | | | | | | |
| Name | | | | Institution | | | Role | | | | |
| SANKARA Moussa | | | | ICRISAT | | |  | | | | |
| Birhanu Zemadim | | | | ICRISAT | | |  | | | | |
|  | | | |  | | |  | | | | |
|  | | | | | | | | | | | |
| e. Student(s) | | | | | | | | | | | |
| Name | | | Institute | | | Degree | | | Start | | End |
| 1. | | |  | | |  | | |  | |  |
| 2. | | |  | | |  | | |  | |  |
| 3. | | |  | | |  | | |  | |  |
|  |  | | | | | | | | | | |
| f. Location(s) |  | | | | | | | | | | |
| g. Start | March, 2017 | | | | | | | | | | |
| h. End | September, 2017 | | | | | | | | | | |
|  |  | | | | | | | | | | |
| 1. Justification | | | | | | | | | | | |
| In the context of the AR phase II implementation aiming at scaling technologies developed in the phase I, it is important to determine the effects of land tenure property, socioeconomic, institutional and others environment variables that can influence the technology adoption. The study will help to identify the best approach to ease the technology adoption by small holder’s farmers Mali. | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 2. Objectives | | | | | | | | | | | |
| 2.1 Determine the effects of land ownership on technology adoption, especially those promoted by AR | | | | | | | | | | | |
| 2.2 Determine the effects of socioeconomic and institutional variables that influence technology adoption, especially those promoted by AR | | | | | | | | | | | |
| 2.3 determine the effects of others variables such as being a member of an association on technology adoption | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 3. Research questions | | | | | | | | | | | |
| 3.1 Do land ownership, socioeconomic, institutional and others variables have an influence on technology adoption? | | | | | | | | | | | |
| 3.3 | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc). | | | | | | | | | | | |
| 4.1 This research paper will use the data collected by IFPRI team during the baseline data collection | | | | | | | | | | | |
| 5. Data to be collected and uploaded | | | | | | | | Responsibility/Institute | | | |
| 5.1 **Non Applicable** | | | | | | | |  | | | |
| 6. Milestones | | | | | | | | | | | |
| Deliverables | | | | | Means of verification | | | | | Date | |
| 6.1 Research proposal by the end of March, 2017 | | | | | Research proposal | | | | | March, 31st | |
| 6.2 | | | | |  | | | | |  | |
|  | | | | | | | | | | | |
| 7. Sustainable intensification indicators | | | | | | | | | | | |
| 7.1 Productivity | | Non Applicable | | | | | | | | | |
| 7.2 Environmental | | Non Applicable | | | | | | | | | |
| 7.3 Economic | | Non Applicable | | | | | | | | | |
| 7.4 Social | | Non Applicable | | | | | | | | | |
| 7.5 Human | | Non Applicable | | | | | | | | | |
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| Sub-activity 1.3 | | Improving crop livestock productivity and household income through the use of contour bunding and agroforestry options | | | | | | | | | | |
| d. Research team | | | | | | | | | | | | |
| Name | | | | | Institution | | | Role | | | | |
| Kalifa TRAORE | | | | | IER | | | Protocol, data processing, reporting | | | | |
| Cheick oumar Dembele | | | | | IER | | | Implementation, data collection and record | | | | |
| Fotigui Tamboura Cisse | | | | | IER | | | Implementation, data collection | | | | |
| Oumar Samake | | | | | IER | | | Implementation, data collection and record | | | | |
|  | | | | | | | | | | | | |
| e. Student(s) | | | | | | | | | | | | |
| Name | | | | Institute | | | Degree | | | | Start | End |
| 1. Cheick oumar Dembele | | | | IER | | | PhD | | | | 2017 | 2020 |
| 2. Fotigui Tamboura Cisse | | | | IER | | | MSc | | | | 2017 | 2018 |
| 3. | | | |  | | |  | | | |  |  |
|  |  | | | | | | | | | | | |
| f. Location(s) | Bougouni and Koutiala | | | | | | | | | | | |
| g. Start | March 2017 | | | | | | | | | | | |
| h. End | December 2017 | | | | | | | | | | | |
|  |  | | | | | | | | | | | |
| 1. Justification  Key elements to ensure sustainability of agriculture-livestock systems are adequate production of quality forage for animal supplementation but also availability of water and soil nutrients (Pening de Vries and Djiteye, 1982). Among these quality forages, fast-growing nitrogen fixing tree species and herbaceous plants occupy a prominent place. According to Breman and Kessler (1995), the power to concentrate and save nutrients, produce and maintain high biomass quantity exceeds far that of cereals and other grass species. It’s in this perspective that we propose to study possibilities of introducing fast-growing forage tree species in farmer’s fields under contour bunding in order to improve the performance of their households. | | | | | | | | | | | | |
| 2. Objectives | | | | | | | | | | | | |
| 2.1 Monitor growth and quantify forage production of fast growing trees species | | | | | | | | | | | | |
| 2.2 Increase crop yield through improving rainwater conservation in improved cropping systems | | | | | | | | | | | | |
| 2.3 Study the effects of fast growing trees species on soil physicochemical properties | | | | | | | | | | | | |
|  | | | | | | | | | | | | |
| 3. Research questions | | | | | | | | | | | | |
| 3.1 How can the use of CBT increase crop grain and straw biomass yield? | | | | | | | | | | | | |
| 3.2 Does the use of CBT increase trees growth and biomass? | | | | | | | | | | | | |
| 3.3.Does the use of CBT improve soil physical and chemical properties | | | | | | | | | | | | |
| 4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc). | | | | | | | | | | | | |
| 4.1 Twenty collaborative farmers will be chosen in two villages. Prior to implementation, soil sampling will be performed using an auger at 0-20 cm and 20-40 cm depth and samples send for physico- chemical analysis in the soil- water - Plant laboratory of IER. The field of each farmer will be divided in two parts. The first part is under contour bunding (CB) i.e. ridges follow contour lines and the second one with farmer’s practices labeled as non-contour bunding (NCB) implemented as a control. The contour lines will be planted with fast growing trees species chosen by farmers. In each part, trials based on cotton or maize intercropped with soybean will be implemented. In each trials only the inputs (fertilizer, pesticides) will be brought by researchers, all the others factors (crop species, varieties, tillage technique, maintenance etc.) will be those of farmers. In two fields, soil moisture will be monitored using TDR probes in CB and NCB plots.  For cotton, 4 treatments corresponding to 4 levels of fertilization will be concerned: Recommended fertilization F1 (100 kg ha-1 of NPKSB (14-18-18-6-1)+50 kg of Urea applied 10-15 days after sowing and 100 kg ha-1 of Urea 45 days after sowing); F2 (F1 + 1000 kg ha-1 of Organic manure); F3 (F1 + 200 kg of Rock Phosphate of Tilemsi); F4 (F3 + 1000 kg ha-1 of Organic manure). Rock phosphate and organic manure will be broadcast before plowing or ridging. Plot size will be 10 m X 4 m with six rows plot-1 and a 1 m alley between plots. Cotton will be sown at 0.8 m X 0.4 m and thinned to obtain 2 plants hole-1  For maize, 3 treatments will be considered: Maize sole crop (T1), soybean sole crop (T2) and Maize intercropped with soybean (T3). 100 kg ha-1 of NPK (17-17-17) + 50 kg ha-1 of Urea will be applied on maize and 100 kg ha-1 of NPK (17-17-17) on soybean. Plot size will be 10 m X 4.8 m i.e. 48 m2 with seven rows plot-1 and a 1 m alley between plots. Maize sole crop will be sown at 0.8 m X 0.4 m and thinned to obtain 2 plants hole-1 and 3.2 m x 0.4 m when intercropped. Soybean will be sown at 0.8 m X 0.15 m in sole crop and 0.8 m x 0.30 m when intercropped. Crop yields will be measured in central rows of each plot by discarding two rows along the border of each side of the plot.  The experiment will lay out in split plot in a randomized complete block design with 20 replications scattered in farmer’s field, each being a replication. The main plot will be the two ridging techniques and the subplots the treatments type.  Biophysical measurement (height, basal diameter, crown radius and diameter at 1.3 m height when possible) will be performed on fast growing trees species starting at their plantation date. | | | | | | | | | | | | |
| 4.2 Data will be analyzed using STATBOX 7. Analyze of variance was used to assess performance of treatments and means comparison by LSD procedure. | | | | | | | | | | | | |
| 5. Data to be collected and uploaded | | | | | | | | | | Responsibility/Institute | | |
| 5.1 Soil physical and chemical properties | | | | | | | | | |  | | |
| 5.2. Soil moisture content | | | | | | | | | |  | | |
| 5.2 Trees biophysical parameters | | | | | | | | | |  | | |
| 5.3 Crop yield (biomass and grain) | | | | | | | | | | | | |
|  | | | | | | | | | | | | |
| Deliverables | | | | | | Means of verification | | | Date | | | |
| 6.1 Trials have been implemented | | | | | | Field visit , technical report and IER’s yearly committee of Program report | | | December 2017 (Africa Rising technical report) and June 2018 (IER’s yearly committee of Program report) | | | |
| 6.2 Farmer exchange visit | | | | | | Field visit , technical report and IER’s yearly committee of Program report, pictures (photo and film) | | | December 2017 (Africa Rising technical report) and June 2018 (IER’s yearly committee of Program report) | | | |
|  | | | | | | | | | | | | |
| 7. Sustainable intensification indicators | | | | | | | | | | | | |
| 7.1 Productivity | | | Crop production, .input use efficiency, .cropping intensity | | | | | | | | | |
| 7.2 Environmental | | | Soil quality (nutrients level) | | | | | | | | | |
| 7.3 Economic | | | Profitability, Returns to land labour and inputs, diversification of income sources | | | | | | | | | |
| 7.4 Social | | | Gender equity; social cohesion; | | | | | | | | | |
| 7.5 Human | | | livelihoods | | | | | | | | | |
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| Sub-activity 1.4 | | Field measurement and nutrient quality assessment of runoff, erosion, soil water content, water table and vegetation from field to watershed scale under different land use and land management practices. | | | | | | | | | |
| Research team | | | | | | | | | | | |
| Name | | | | | Institution | | | Role | | | |
| Kalifa TRAORE | | | | | IER | | | Protocol, data processing, reporting | | | |
| Birhanu Zemadim | | | | | ICRISAT | | | Protocol, data processing, reporting | | | |
| Cheick oumar Dembele | | | | | IER | | | Implementation, data collection and record | | | |
| Fotigui Tamboura Cisse | | | | | IER | | | Implementation, data collection | | | |
| Oumar Samake | | | | | IER | | | Implementation, data collection and record | | | |
|  | | | | | | | | | | | |
| e. Student(s) | | | | | | | | | | | |
| Name | | | | Institute | | | Degree | | | Start | End |
| 1. Cheick oumar Dembele | | | | IER | | | pHD | | | 2017 | 2020 |
| 2. Fotigui Tamboura Cisse | | | | IER | | | Msc | | | 2017 | 2018 |
| 3. | | | |  | | |  | | |  |  |
|  |  | | | | | | | | | | |
| f. Location(s) | Koutiala | | | | | | | | | | |
| g. Start | March 2017 | | | | | | | | | | |
| h. End | December 2017 | | | | | | | | | | |
|  |  | | | | | | | | | | |
| 1. Justification: Water is one of the main constraints to crop production (Breman and Kessler, 1995b) as it influences directly plants, this is why it’s very important to minimize rain water lost by runoff in rainfed agriculture (Gigou et al., 2006). In low inputs agriculture systems in the semi-arid zones like those of Mali, the development of water conservation techniques is essential to ensure the sustainability of farming systems (Traore, 2003). Improving livelihoods trough increasing production in this low inputs agriculture need to take in to account watershed management approach which included crops, livestock, trees, soils, water, land use systems, production systems, agroforestry systems, etc. According to Germain et al. (2007), watershed approach is a strategy to manage natural resources with regards to interactions between biophysical resources, social institutions and human activities within the landscape. | | | | | | | | | | | |
| 2. Objectives | | | | | | | | | | | |
| 2.1 Follow up changes in watershed components (biophysical and socio-economic monitoring). | | | | | | | | | | | |
| 2.2 Perform measurements both at the field level (soil moisture and runoff/erosion) and water table at the watershed level. | | | | | | | | | | | |
| 2.3 Extend land and water management practices in the watershed and fertility management in farmer’s field as demonstration | | | | | | | | | | | |
| 3. Research questions | | | | | | | | | | | |
| 3.1: Does water conservation can lead to changes in cropping systems, livestock systems, vegetation cover and diversity, soil quality, water dynamics, land use systems (vegetable gardening for instance)? | | | | | | | | | | | |
| 3.2 : How can a wide implementation of water conservation technique impact water table dynamic at the watershed level? | | | | | | | | | | | |
| 3.3.How the extension of land and water management practices can increase farmer’s demands of the tested technology kit? | | | | | | | | | | | |
| 4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc). | | | | | | | | | | | |
| 4.1 Equipment to measure runoff and erosion was installed in two fields. In each field, the experiment plot was divided in two parts and four set of measurement equipment were installed. In the first part ridges follow the contour lines referred to contour bonding (CB) when in the second neighboring plot traditional farmer practices (NCB) implemented as a control. Two replications were implemented in the contour lines plot and two other in the control. The two parts were homogeneously managed concerning all field operations and crop species.  Runoff device comprises a diverter holed at 1 / 10 having the following characteristics: An oblique iron sheet of 40 cm length to avoid the entry of diverted water in the tank, another of 33 cm constituting the width, a water supply pipe of 60 cm length. Then, two tanks graduated from 0 to 200 liters , a cover sheet size 1.8 x 1m , all placed in a 1.5m X 0.7 m and 1.3 m deep pit.  Measurements will be performed in an area of 24 m2. During each rain events which produce runoff, 1 liter sample will be collected after homogenization of the water in the tank by intense agitation using a wooden tool. These samples will be sent for laboratory analysis. TDR probe was used to measure soil moisture and piezometer for water table level.  All changes related to trees regeneration, new grass species, soil physical changes (small ponds etc.), land use systems (vegetable gardening linked to water table dynamic etc.) will be mapped using a GPS.  Biophysical measurement (height, basal diameter, crown radius and diameter at 1.3 m height when possible) will be performed on regenerated trees species in the watershed.  At the end of each cropping season and farmer exchange visit, all the new demands for the technology will be recorded and actions planned for the next rainy season. | | | | | | | | | | | |
| 4.2 Data will be analyzed using EXCEL7. Analyze of variance will be used to assess performance of treatments and means comparison by LSD procedure. | | | | | | | | | | | |
| 5. Data to be collected and uploaded | | | | | | | | | Responsibility/Institute | | |
| 5.1 variation of water table level | | | | | | | | |  | | |
| 5.2. Soil moisture content | | | | | | | | |  | | |
| 5.3. Runoff and erosion values | | | | | | | | |  | | |
| 5.4 Biophysical parameters of regenerated Trees | | | | | | | | |  | | |
| Deliverables | | | | | | Means of verification | | | Date | | |
| 6.1 Water table levels is monitored | | | | | | Field visit of equipmenet, technical report and IER’s yearly committee of Program report | | | December 2017 (Africa Rising technical report) and June 2018 (IER’s yearly committee of Program report) | | |
| 6.2 Soil moisture content, runoff and erosion values are available | | | | | | Field visit of the measurement equipment, technical report and IER’s yearly committee of Program report, pictures (photo and film) | | | December 2017 (Africa Rising technical report) and June 2018 (IER’s yearly committee of Program report) | | |
| 6.3 Biophysical parameters of trees | | | | | | Field visit of the measurement equipment, technical report and IER’s yearly committee of Program report, pictures (photo and film) | | | December 2017 (Africa Rising technical report) and June 2018 (IER’s yearly committee of Program report) | | |
|  | | | | | | | | | | | |
| 7. Sustainable intensification indicators | | | | | | | | | | | |
| 7.1 Productivity | | | Crop production, .input use efficiency, .cropping intensity | | | | | | | | |
| 7.2 Environmental | | | Soil quality (nutrients level), reforestation | | | | | | | | |
| 7.3 Economic | | | Profitability, diversification of income sources | | | | | | | | |
| 7.4 Social | | | Gender equity; social cohesion; | | | | | | | | |
| 7.5 Human | | | livelihoods | | | | | | | | |
|  | | | | | | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **8. Budget (US$)** |  |  |  |  |
| Outcome/Output/Activity | Sub-activity | Budget Line | ICRISAT | IER |
| Outcome 1/Output 2/Activity 1 | 2.1 | Personnel |  |  |
|  |  | Services |  |  |
|  |  | Supplies |  |  |
|  |  | Capital |  |  |
|  |  | Travel |  |  |
|  |  | Overhead | 3740 |  |
|  |  | Total | 23740 |  |
| Outcome 1/Output 2/Activity 1 | 2.2 | Personnel |  |  |
|  |  | Services |  |  |
|  |  | Supplies |  |  |
|  |  | Capital |  |  |
|  |  | Travel |  |  |
|  |  | Overhead |  |  |
|  |  | Total | 0 |  |
| Outcome 1/Output 2/Activity 1 | 2.3 | Personnel |  |  |
|  |  | Services |  |  |
|  |  | Supplies |  |  |
|  |  | Capital |  |  |
|  |  | Travel |  |  |
|  |  | Overhead |  | 1870 |
|  |  | Total |  | 11870 |
| Outcome 1/Output 2/Activity 1 | 2.3 | Personnel |  |  |
|  |  | Services |  |  |
|  |  | Supplies |  |  |
|  |  | Capital |  |  |
|  |  | Travel |  |  |
|  |  | Overhead |  | 2805 |
|  |  | Total |  | 17805 |

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| --- |
| **Outcome 2: More farmers and farm families in the intervention communities are adopting technologies and practices to improve nutrition, food and feed safety, post-harvest handling and value addition.** |
| **Output 1: Improved technologies, practices and habits to increase production and consumption of diverse and more nutritious food by farm families, especially by women and children are developed.** |

**Activity 1: Develop a nutrition strategy to harmonize the nutrition activities national nutrition approaches and link them to the crop and livestock activities**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sub-activity 1.1 | Evaluation of nutrition-sensitive-agriculture options in West Africa | | | | | | | | | | |
| Research team | | | | | | | | | | | |
| Name | | | | Institution | | | Role | | | | |
| Augustine Ayantunde | | | | ILRI | | | Lead Livestock component | | | | |
| Caroline Makamto Sobgui | | | | WorldVeg | | | Lead Nutrition component Mali | | | | |
| Mahama Saaka | | | | UDS | | | Lead Nutrition component Ghana | | | | |
| Jean Baptiste Tignegre | | | | WorldVeg | | | Breeder | | | | |
| Nantoume Hamidou | | | | IER | | | Animal nutritionist | | | | |
| ARI - Scientist | | | | ARI | | | Animal scientist | | | | |
| Pierre Coulibaly | | | | AMEDD | | | Field Technician | | | | |
| Student(s) | | | | | | | | | | | |
| Name | | | Institute | | | Degree | | | Start | | End |
| 1. To be identified Ghana | | |  | | | PhD | | | 2017 | | 2020 |
| 2. To be identified Mali | | |  | | | PhD | | | 2017 | | 2020 |
|  |  | | | | | | | | | | |
| Location(s) | Project communities in Ghana and Mali (to be implemented by PhD and MSc students funded by Africa RISING in Ghana and Mali) | | | | | | | | | | |
| Start | 2017 | | | | | | | | | | |
| End | 2021 | | | | | | | | | | |
|  |  | | | | | | | | | | |
| 1. Justification | | | | | | | | | | | |
| Agricultural practices and interventions can be better adapted and redesigned to maximize health and nutrition benefits and to reduce malnutrition and diseases. The importance of consumption of animal source food (ASF) for cognitive development of children is well documented. For example nutritional study in Gourma in Northern part of Mali showed that the children of mobile pastoralists were better nourished based on weight-height, weight-age and height-age measures than children of sedentary farmers and that the children of the sedentarized pastoralists seem to be worst off (Pederson & Benjaminsen, 2008; ; Human Ecology 36:43–57). The children under these studies were 6 to 60 months. The explanation for this trend was largely attributed to consumption of milk. This underscores the important role that livestock systems play in human nutrition as the households that keep livestock are more likely than their non-holding counterparts to consume ASF because of their proximity to the nutrient-rich foods. Increased consumption of ASF by the rural households may prevent or reduce stunting in children and will improve the health of the households particularly children and vulnerable women. Thus, there is need for increased consumption of animal source food by the households in crop-livestock systems in Africa RISING intervention communities where staple food is largely based on cereals. One pathway to improve the consumption of ASF is through improvement in livestock production, for example improved milk and meat by ruminants (cattle, sheep and goats) and non-ruminants (poultry and pigs), and egg production by poultry. As the women are known to play key in household nutrition, livestock-related nutrition interventions should be gender-sensitive. In addition to ASF, consumption of other nutritious food and vegetables is necessary and will be addressed in this study. Bringing together agriculture, nutrition and health will help to address immediate and underlying cause of malnutrition and nutrition insecurity in the Africa RISING intervention communities. In addition to interventions to improve household nutrition, there will be focus on building capacity in best nutrition practices and nutrition behavior change communication targeted at women to foster the creation of an environment where women feel comfortable to change and adopt best nutrition practices. | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 2. Objectives | | | | | | | | | | | |
| 2.1 The overall objective of this integrated livestock-vegetable-nutrition activity is to evaluate the effects of the improved intensification options, such as livestock-related and vegetable-related nutrition interventions on household nutrition particularly children and women of reproductive age. The specific objectives are: ii) To characterize nutrition practices of the households in the study areas and quantify gender-differentiated roles in household nutrition practices; (iii) To assess the effect of livestock productivity enhancing interventions and vegetable production in home-gardens on household nutrition particularly children under 2 years. The underlying hypothesis is that productivity enhancing intensification options will lead to improvement of household food security and nutrition thereby enhancing gender equity. | | | | | | | | | | | |
| 3. Research questions | | | | | | | | | | | |
| 3.1. Does a community-based integrated agriculture, nutrition and health program foster adoption of improved nutrition practices and reduce malnutrition among children under five years? | | | | | | | | | | | |
| 3.2. What are the roles of women in improving household food security and nutrition? | | | | | | | | | | | |
| 3.3 What are the effects of livestock-related intervention and vegetable production (home-garden) on nutrition of children and women of reproductive age, and household diet diversity? | | | | | | | | | | | |
| 3.4 Does social mobilization for nutrition and health create avenue where young women are empowered to adopt and practices best nutrition practices? | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc). | | | | | | | | | | | |
| 4.1. Community based intervention using a quasi-experimental design with a baseline survey and an end of project survey.  The study will be conducted in 4 Africa RISING intervention communities and will involve focus group discussions and individual surveys to collect gender-disaggregated data on roles of gender in household nutrition and to characterize household nutrition practices of the selected households. Survey of marketed foods in the study areas will be conducted as available food types in the markets and price may influence household nutrition and diet diversity. To establish dietary diversity of selected households, surveys will be executed that quantify the Minimum Diet Diversity for Women (MDD-W) score, and infant and young children feeding practices (children dietary diversity score, minimum acceptable diet). In addition, anthropometric measurements (weight for age/height, height for age) of children in selected households in the study areas will be carried out.  Project interventions will include introduction of livestock (e.g., dairy goat, domestic chicken or guinea fowl) breeds to the intervention communities after assessment of performance on-station. The dairy goats and domestic chicken or guinea fowl will be given to selected women in 2 project communities to manage after training in improved husbandry practices while 2 other communities where there is no intervention will serve as control. The women are targeted to ensure that the milk and egg produced goes into household nutrition, particularly for consumption of children under 2 years. In addition to livestock intervention, vegetable garden will be established by the women involved in the treatment communities and they will be trained in improved cooking practices for preparing the vegetable grown for household consumption. The manure from goats will be collected and applied to vegetable garden.  The trained women are expected to have gained knowledge about gardening, and animal husbandry thereby leading to a better understanding of how agricultural interventions can improve family nutrition and health. This perceived benefits of the interventions is expected to motivate the women to actively participate in the study. Behavior change communication (BCC) group sessions on improved nutrition and cooking demonstrations (aimed at optimizing the nutritional quality) will be held and targeted at beneficiaries, particularly women of reproductive age. Community mobilization activities will be organized in targeted villages with selected groups including local stakeholders, and groups of men and grandmothers. A quasi experimental design will be used to evaluate the impact of this intervention on target communities by using the data collected during the baseline and the end of project survey. Gender disaggregated data will be collected during monitoring activities and surveys. | | | | | | | | | | | |
| 5. Data to be collected and uploaded | | | | | | | | Responsibility/Institute | | | |
| 5.1. survey data upload in CKAN | | | | | | | | WorldVeg | | | |
| 5.2. Monitoring data upload in CKAN | | | | | | | | WorldVeg | | | |
| 5.3 Animal performance data | | | | | | | | ILRI/ARI/IER | | | |
|  | | | | | | | | | | | |
| 6. Milestones | | | | | | | | | | | |
| Deliverables | | | | | Means of verification | | | | | Date | |
| 6.1. Baseline survey data (quantitative and qualitative) | | | | | Report submitted and data upload in CKAN | | | | | May 2018 | |
| 6.2. On-station assessment of the productive performance of improved dairy goat and domestic chicken/guinea fowl, and development of feed package for the dairy goat | | | | | Report | | | | | May 2018 | |
| 6.3 Establishment of home garden (nutrition garden) and monitoring | | | | | Reports | | | | | April 2018 | |
| 6.4 Training in best nutrition practices and improved animal husbandry | | | | | Reports | | | | | Various dates | |
| 6.5. End of project survey data (quantitative and qualitative) | | | | | Report submitted and data upload in CKAN | | | | | May 2020 | |
| 6.6. Articles published | | | | | Article available online | | | | | December 2020 | |
|  | | | | | | | | | | | |
| 7. Sustainable intensification indicators | | | | | | | | | | | |
| 7.1 Productivity | | - Milk yield, number of egg produced per chicken, egg weight  -Biomass of vegetable produced | | | | | | | | | |
| 7.2 Environmental | | -Quantity and quality of animal manure produced | | | | | | | | | |
| 7.3 Economic | | Cost and benefit of nutrition garden and livestock interventions | | | | | | | | | |
| 7.4 Social | | -Percentage of trained beneficiaries who has established a nutrition garden | | | | | | | | | |
| 7.5 Human | | - Number of women of child bearing age trained in behavioral change communication  - Number of children aged 0-59 months reached by nutrition intervention as the result of USAID  - Percent of women of child bearing age meeting minimal diet diversity score  - Prevalence of children aged 6-23 month receiving a minimum acceptable diet  - Number of households benefiting from nutrition intervention per country  -Prevalence of stunting, wasting and underweight among children under 5 years  - Number of functional community-based partnerships established to exchange knowledge and information on nutrition, agriculture and facilitate community dialogue | | | | | | | | | |

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| Sub-activity 1.2 | Evaluate and promote dry season vegetable varieties (tomato, pepper, Eggplant and onion), with optimized integrated and profitable crop management practices from field to storage and consumption (use of optimized fertilizer, irrigation options under zero energy and ecological storage facilities (use of Zero Cooling Energy chambers for fresh fruit and leafy vegetables and zero energy and ecological onion cribs that preserve product quality) | | | | | | | | | | |
| Research team | | | | | | | | | | | |
| *Name* | | | | *Institution* | | | *Role* | | | | |
| Jean-Baptiste Tignegre | | | | World Vegetable Center, Mali | | | Project manager, plant breeder | | | | |
| Caroline M. Sobgui | | | | World Vegetable Center, Mali | | | Nutritionist | | | | |
| Bekele (IITA), Badolo Felix (ICRISAT) | | | | ICRISAT | | | Cost-benefit analysis-Profitability | | | | |
| Takemore Tchagomoka | | | | World Vegetable Center, Mali | | | Crop production expert | | | | |
| Wubetu Legesse | | | | World Vegetable Center, Mali | | | Plant Pathology | | | | |
| Linda Dari | | | | Department of Food Science and Technology, UDS, Tamale, Ghana | | | Food technology scientist (quality and safety) | | | | |
| Augustine Ayatunde | | | | ILRI, Burkina Faso | | | Livestock Scientist | | | | |
|  | | | | | | | | | | | |
| e. Student(s) | | | | | | | | | | | |
| Name | | | Institute | | | Degree | | Start | End | | |
| Alpha Sidy Traore | | | University of Ouagadougou, Burkina Faso | | | Ph.D. | | March 2017 | February 2020 | | |
| Lamine Samake | | | IPR/IFRA Katibougou, Mali | | | M.Sc. | | March 2017 | February 2019 | | |
| A student on food Technology (Linda to provide student) | | | University of development studies, Tamale | | | M.Sc. | | June 2017 | April 2020 | | |
|  |  | | | | | | | | | | |
| f. Location(s) | Koutiala, Bougouni in Mali | | | | | | | | | | |
| g. Start | August 2017 | | | | | | | | | | |
| h. End | April 2018 | | | | | | | | | | |
|  |  | | | | | | | | | | |
| Justification  Tomato (Lycopersicum esculentum), pepper (Alum cepa) and okra (Abelmoschus sp.) are very popular vegetable crops throughout tropical Africa. These crops are mainly cultivated in West Africa for leaves and/or fruits. Dry season vegetable growing activities are source of income, food diversification and contributes to crop production intensification through year round production.  In Sudan savanna of Mali, vegetable value chain faces diverse challenges hindering the production. The major constraints are low productivity of the genetic materials used, which genetic potential is often low, unsuitable for intensification coupled with low application of good crop management practices (fertilization, planting densities) by small holder farmers. Such treats aggravated by important crop losses during storage due lack of appropriate or affordable storage facilities which often result in low quality of products with low commercial values. Integrated production technologies and adapted post-harvest managements of vegetables can intensify crop production and improve household farmer livelihood in rural areas of West and Central Africa. | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 2. Objectives | | | | | | | | | | | |
| 2.1 Test and disseminate water and fertilizer use efficiencies and water management technologies for vegetable production in the dry season | | | | | | | | | | | |
| 2.2 Test the performance of new promising and high beta-caroten tomato and onion varieties using participatory variety selection | | | | | | | | | | | |
| 2.3 Test and disseminate ecological storing prototypes using zero energy cooling system for storage of tomato, leafy vegetables and onion | | | | | | | | | | | |
| 2.4 Determine the food quality and safety (pathogens) under storage involving the above storing prototypes | | | | | | | | | | | |
| 2.5 Determine the profitability of vegetables in the dry season | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 3. Research questions | | | | | | | | | | | |
| 3.1 Which improved vegetable varieties and irrigation and fertilizer options can increase productivity under smallholder production systems? | | | | | | | | | | | |
| 3.3 What are the effectiveness of the ecological storage prototypes to store and preserve product quality and safety? What are farmers’perceptions on these prototypes (acceptance, affordability)? | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc).  The intervention sites will be in the technology parks (Mali) and the Lead farms (Ghana) and farmers’ fields. The same protocols will apply for both Ghana and Mali on dry season vegetable trials. The methodology for the research will be mother and baby trials. Mother trials refer to trials conducted in the Lead farms (Ghana) and technology parks (Mali) where irrigation facilities are available and managed by research technicians. Baby trials are conducted on farmer’s field under the management farmers and technicians. | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 5. Data to be collected and uploaded | | | | | | | | | | Responsibility/Institute |
| Farm position in the landscape; rainfall amount & repartition in time | | | | | | | | | | WorldVeg | |
| Farmers’ wealthiest, market orientation, labor cost, input amount and cost, quantity of produce auto-consumed and sold and income generated, profitability; | | | | | | | | | | ICRISAT | |
| Biological data: SD: Sowing date; TNP/P: Total number of plants per plot; 50%FL: Days to 50% flowering; NPF/p: Number of plants bearing fruits per plot; TNF/P: Total number of fruits per plot; WF/p (kg): Fruit weight per plot; Yield (ton/ha): Fruit yield; SM (%): Soil moisture recorded weekly; WA (water applied as measured in volume (L or m3, or number of water cans applied to convert to volume of water applied);  Other data: GPS position of farm land; Farmer sex; Farmers’ wealthiest; Market orientation of crop; soil fertility. | | | | | | | | | | WorldVeg | |
| 6. Milestones: | | | | | | | | | | | |
| Deliverables | | | | | Means of verification | | | | | Date | |
| 6.1 At least one farmer preferred variety identified by March, 2018. | | | | | Reports, varieties selected | | | | | April 2018 | |
| 6.2 At one optimized irrigation option, one adapted planting density and one optimized fertilizer dose identified in the technology parks and AR villages in Bougouni and Koutiala | | | | | Reports, varieties selected, drip irrigation system, data in CKAN | | | | | April 2018 | |
| 6.3 At least one prototype of Zero Energy Cooling Chambers (ZECC) in 3 technology parks and one onion storage crib in Koutiala | | | | | Reports, varieties selected, prototypes of storing facilities, drip irrigation system, data in CKAN | | | | | October 2018 | |
| 7. Sustainable intensification indicators | | | | | | | | | | | |
| 7.1 Productivity | | Production Yield (kg/ha), fruit or grain quality (commercial yield)  Farmer perceptions and ratings of technology yield performance | | | | | | | | | |
| 7.2 Environmental | | Quantity applied per ha by type; Farmer perceptions of water availability | | | | | | | | | |
| 7.3 Economic | | Profitability; kg output / unit input | | | | | | | | | |
| 7.4 Social | | Rating of technologies across locally determined categories (1-3); Access to production factors (mechanization, land)1-4; Decision-making about production, marketing (by crop)1-4; Women Empowerment in Agriculture Index (1 and 4) | | | | | | | | | |
| 7.5 Human | | Literacy and numeracy of adults (1,2) | | | | | | | | | |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sub-activity 1.3: | Strengthen capacity of local communities to prevent and address malnutrition though integrated agriculture, nutrition and health activity and communication for social and behavior change | | | | | | | | | | |
| Research team | | | | | | | | | | | |
| Name | | | | Institution | | | Role | | | | |
| Caroline Makamto Sobgui | | | | WorldVeg | | | Team Leader | | | | |
| Jean Baptiste Tignegre | | | | WorldVeg | | | Breeder | | | | |
| Honafing Diarra | | | | WorldVeg | | | Research Associate | | | | |
| Raky Diallo | | | | World Veg | | | Research Associate | | | | |
| Awa Konate | | | | WorldVeg | | | Field Technician | | | | |
| Pierre Coulibaly | | | | AMEDD | | | Field Technician | | | | |
| e. Student(s) | | | | | | | | | | | |
| Name | | | Institute | | | Degree | | | Start | | End |
| 1. | | |  | | |  | | |  | |  |
| 2. | | |  | | |  | | |  | |  |
| 3. | | |  | | |  | | |  | |  |
|  |  | | | | | | | | | | |
| f. Location(s) | Koutiala | | | | | | | | | | |
| g. Start | 2017 | | | | | | | | | | |
| h. End | 2021 | | | | | | | | | | |
|  |  | | | | | | | | | | |
| 1. Justification | | | | | | | | | | | |
| Agricultural practices and interventions can be better adapted and redesigned to maximize health and nutrition benefits and to reduce malnutrition and diseases. The main objective of agriculture intervention should be to improve human nutrition and health through direct use of produced crops or by using the income generate by selling the surplus to buy crops which are not available at household. Bringing together agriculture, nutrition and health will help to address immediate and underlying cause of malnutrition and nutrition insecurity.  The aim of this activity is to improve livelihoods, empowerment of women and nutrition resilience of agropastoral vulnerable household to food and nutrition insecurity, through an integrated set of productive, social and nutritional interventions. It will help to strengthen capacity of local communities to improve the availability, accessibility and efficient use of locally produce crops and animal products to prevent and address women and child malnutrition and also foster the creation of an environment where women fill comfortable to change and adopt optimal young child feeding practices.  This activity will be implemented in integration with with subactivity 1.1, subactivity 2.5 and subactivity 2.6 on vegetable production and small lifestock production. | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 2. Objectives | | | | | | | | | | | |
| 2.1 To improve household nutrition practices | | | | | | | | | | | |
| 2.2 To improve infant and young child feeding practices | | | | | | | | | | | |
| 2.3 | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 3. Research questions | | | | | | | | | | | |
| 3.1. Does a community-based integrated agriculture, nutrition and health program can help to foster adoption of improve nutrition practices and reduce under five malnutrition rate? | | | | | | | | | | | |
| 3.3. Does social mobilization for nutrition and health can create a venue where young women are empower to adopt and practices optimal nutrition practices | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc). | | | | | | | | | | | |
| 4.1. Community based intervention using a quasi-experimental design with a baseline survey and an end of project survey.  According to the theory of change, the trained women will have gained knowledge about gardening, cereal and lifestock production and a better understanding of how the household garden can improve family nutrition and health. This, together with a one-time supply of minimally required inputs, is expected to motivate the women to establish and maintain their own household gardens. Implementing partners regularly visit the women to re-emphasize the message and provide technical advice.  The intervention consists of the following four components:   * Behavior change communication (BCC) group sessions on improved nutrition, WASH, postharvest methods, and cooking demonstrations (aimed at optimizing the nutritional quality) will be held and targeted at beneficiaries. * Women's training in home gardening , cereal production and lifestock production * Vegetable and cereal seed kits for planting. * Follow-up training and home visits organized to reinforce the training lessons. * Community mobilization activities will be held in targeted villages with selected groups including local stakeholders, and groups of men and grandmothers.   A quasi experimental design will be used to evaluate the impact of this intervention on target communities by using the data collected during the baseline and the end of project survey. 150 pregnant or lactating women or with children aged 0-23 months will be sample in intervention and control arm. Gender disaggregated data will be collected during monitoring activities and surveys. | | | | | | | | | | | |
| 5. Data to be collected and uploaded | | | | | | | | Responsibility/Institute | | | |
| 5.1. survey data upload in CKAN | | | | | | | | WorldVeg | | | |
| 5.2. Monitoring data upload in CKAN | | | | | | | | WorldVeg | | | |
| 6. Milestones | | | | | | | | | | | |
| Deliverables | | | | | Means of verification | | | | | Date | |
| 6.1. Baseline survey data (quantitative and qualitative) | | | | | Report submitted and data upload in CKAN | | | | | May 2018 | |
| 6.2. End of project survey data (quantitative and qualitative) | | | | | Report submitted and data upload in CKAN | | | | | May 2020 | |
| 6.3. Article published | | | | | Article available online | | | | | December 2020 | |
|  | | | | | | | | | | | |
| 7. Sustainable intensification indicators | | | | | | | | | | | |
| 7.1 Productivity | | - Percentage of trained beneficiaries who has established a homegarden  - Percentage of trained beneficiaries who are doing a small livestock production for family consumption | | | | | | | | | |
| 7.2 Environmental | |  | | | | | | | | | |
| 7.3 Economic | |  | | | | | | | | | |
| 7.4 Social | |  | | | | | | | | | |
| 7.5 Human | | - Number of women of child bearing age trained in behavioral change communication  - Number of children aged 0-59 months reached by nutrition intervention as the result of USAID  - Percent of women of child bearing age meeting minimal diet diversity score  - Prevalence of children aged 6-23 month receiving a minimum acceptable diet  - Number of households benefiting from nutrition intervention per country  -Prevalence of stunting, wasting and underweight among children under 5 years  - Number of functional community-based partnerships established to exchange knowledge and information on nutrition, agriculture and facilitate community dialogue | | | | | | | | | |
| Sub-activity 1.4 | Evaluate and disseminate the best processing technologies that keep nutrient losses to a minimum in crops, fruit and vegetables, livestock products (dairy and meat products) | | | | | | | | | | |
| Research team | | | | | | | | | | | |
| Name | | | | Institution | | | Role | | | | |
| Fatimata CISSE DIALLO | | | | IER | | | Principal investigator | | | | |
| Salimata SIDIBE COULIBALY | | | | IER | | | Co-PI | | | | |
| TOURE Fadimata MAIGA | | | | IER | | | Technician | | | | |
| KONE Mariam DEMBELE IER Technician | | | | | | | | | | | |
| e. Student(s) | | | | | | | | | | | |
| Name | | | Institute | | | Degree | | | Start | | End |
| 1. | | |  | | |  | | |  | |  |
| 2. | | |  | | |  | | |  | |  |
| 3. | | |  | | |  | | |  | |  |
|  |  | | | | | | | | | | |
| f. Location(s) | Bougouni, Koutiala | | | | | | | | | | |
| g. Start | 2017 | | | | | | | | | | |
| h. End | 2018 | | | | | | | | | | |
|  |  | | | | | | | | | | |
| 1. Justification | | | | | | | | | | | |
| One of the main challenges is how to ensure food security for a growing world population while ensuring long-term sustainable development. However massive quantities of food are lost due to spoilage and infestations every day. In countries with tropical weather and less developed infrastructure, wastage can be as high as 40 – 50 %. Therefore, one of the major ways to strengthen food security is by reducing these losses. | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 2. Objectives | | | | | | | | | | | |
| 2.1 Evaluate the best processing technologies that keep nutrient losses to a minimum in crops, fruit and vegetables, and livestock products (dairy and meat products) | | | | | | | | | | | |
| 2.2 Disseminate the tested best processing technologies | | | | | | | | | | | |
| 3. Research questions | | | | | | | | | | | |
| 3.1 How does best processing technologies affect nutrient content of the tested products? | | | | | | | | | | | |
| 3.3 What is the percent reduction of postharvest losses after applying the best processing technologies? | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc). | | | | | | | | | | | |
| 4.1 Processing techniques will be used to reduce postharvest losses in fruits and vegetables.  There will be four treatments:  - T1 : control (fresh produce)  - T2 : drying under shade  - T3 : drying under sun  - T4 : pickling  Quantity and quality of losses will be evaluated, nutritional and sensorial quality also will be determined after conservation. | | | | | | | | | | | |
| 4.2 Processing techniques will be used to reduce postharvest losses in dairy and meat products | | | | | | | | | | | |
| 4.3 Processing techniques will be used to reduce postharvest losses in cereal crops | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 5. Data to be collected and uploaded | | | | | | | | Responsibility/Institute | | | |
| 5.1 Quantity of losses | | | | | | | | Fatimata Cisse Diallo, IER | | | |
| 5.2 Nutrient content before and after best processing techniques | | | | | | | | Fatimata Cisse Diallo, IER | | | |
| 5.3 | | | | | | | |  | | | |
|  | | | | | | | | | | | |
| 6. Milestones | | | | | | | | | | | |
| Deliverables | | | | | Means of verification | | | | | Date | |
| 6.1 Number of best technologies tested; | | | | | Technical Report, Smallholder farmer interviews audio/video clips, | | | | | April 2018 | |
| 6.2 % of postharvest losses; | | | | | Data available on CKAN, | | | | | April 2018 | |
|  | | | | | | | | | | | |
| 7. Sustainable intensification indicators | | | | | | | | | | | |
| 7.1 Productivity | |  | | | | | | | | | |
| 7.2 Environmental | |  | | | | | | | | | |
| 7.3 Economic | |  | | | | | | | | | |
| 7.4 Social | |  | | | | | | | | | |
| 7.5 Human | | % of reduced postharvest losses, # of best technologies tested | | | | | | | | | |
|  | | | | | | | | | | | |

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| **8. Budget (US$)** |  |  |  |  |  |
| Outcome/Output/Activity | Sub-activity | Budget Line | ILRI | WorldVeg | IER |
| Outcome 2/Output 1/Activity 1 | 1.1 | Personnel |  |  |  |
|  |  | Services |  |  |  |
|  |  | Supplies |  |  |  |
|  |  | Capital |  |  |  |
|  |  | Travel |  |  |  |
|  |  | Overhead | 3740 |  |  |
|  |  | Total | 23740 |  |  |
| Outcome 1/Output 2/Activity 1 | 1.2 | Personnel |  |  |  |
|  |  | Services |  |  |  |
|  |  | Supplies |  |  |  |
|  |  | Capital |  |  |  |
|  |  | Travel |  |  |  |
|  |  | Overhead |  |  |  |
|  |  | Total |  | 30000 |  |
| Outcome 1/Output 2/Activity 1 | 1.3 | Personnel |  |  |  |
|  |  | Services |  |  |  |
|  |  | Supplies |  |  |  |
|  |  | Capital |  |  |  |
|  |  | Travel |  |  |  |
|  |  | Overhead |  |  |  |
|  |  | Total |  | 30000 |  |
| Outcome 1/Output 2/Activity 1 | 1.4 | Personnel |  |  |  |
|  |  | Services |  |  |  |
|  |  | Supplies |  |  |  |
|  |  | Capital |  |  |  |
|  |  | Travel |  |  |  |
|  |  | Overhead |  |  | 1870 |
|  |  | Total |  |  | 11870 |

|  |
| --- |
| **Output 2: Postharvest technologies and practices are tested and disseminated to farmers and other partners to reduce postharvest losses** |

**Activity 1: Introduce, evaluate, adapt and disseminate existing postharvest technologies and practices.**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sub-activity 1.1: | Train trainers (technicians, extension workers, partners and community leaders) on the best processing and conservation techniques | | | | | | | | | | |
| Research team | | | | | | | | | | | |
| Name | | | | Institution | | | *Role* | | | | |
| Fatimata CISSE DIALLO | | | | IER | | | *Principal investigator* | | | | |
| Salimata SIDIBE COULIBALY | | | | IER | | | *Co-PI* | | | | |
| TOURE Fadimata MAIGA | | | | IER | | | *Technician* | | | | |
| KONE Mariam DEMBELE IER Technician | | | | | | | | | | | |
| e. Student(s) | | | | | | | | | | | |
| Name | | | Institute | | | Degree | | | Start | | End |
| 1. | | |  | | |  | | |  | |  |
| 2. | | |  | | |  | | |  | |  |
| 3. | | |  | | |  | | |  | |  |
|  |  | | | | | | | | | | |
| f. Location(s) | Bougouni, Koutiala | | | | | | | | | | |
| g. Start | 2017 | | | | | | | | | | |
| h. End | 2018 | | | | | | | | | | |
|  |  | | | | | | | | | | |
| 1. Justification | | | | | | | | | | | |
|  | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 2. Objectives | | | | | | | | | | | |
| 2.1 Strengthen capacity of farmers and farm families on postharvest technologies to reduce postharvest losses | | | | | | | | | | | |
| 2.2 | | | | | | | | | | | |
| 2.3 | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 3. Research questions | | | | | | | | | | | |
| 3.1 N/A | | | | | | | | | | | |
| 3.3 | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc). | | | | | | | | | | | |
| 4.1 The training will be done in cascade. In total 50 trainers (25 trainers per sites, 5 men and 20 women) will be trained. Each trainer will train 10 direct beneficiaries after that each direct beneficiary will train 10 indirect beneficiaries. Training modules will be developed for the local trainers. Knowledge and practices of dietary diversity will be included in the training modules. Elaborated monitoring documents to assess the degree of utilization and practice of the developed processing techniques will be used in order to evaluate the number of families practicing the technologies, the consumption frequencies, etc. these documents will be given to the local trainers to monitor. | | | | | | | | | | | |
| 5. Data to be collected and uploaded | | | | | | | | Responsibility/Institute | | | |
| 5.1 Number of training sessions;; number of modules taught; | | | | | | | | Fatimata Cisse Diallo, IER | | | |
| 5.2 Number of trainers trained disaggregated by gender | | | | | | | | Fatimata Cisse Diallo, IER | | | |
| 5.3 Number of direct beneficiary trained; | | | | | | | | Fatimata Cisse Diallo, IER | | | |
|  | | | | | | | | | | | |
| 6. Milestones | | | | | | | | | | | |
| Deliverables | | | | | Means of verification | | | | | Date | |
| 6.1 Number of training sessions; number of training modules taught; | | | | | Technical Report, training modules available, activity report | | | | | December 2017 | |
| 6.2 Number of trainers trained; number of direct and indirect beneficiary trained | | | | | Technical Report, training modules available, activity report | | | | | December 2017 | |
|  | | | | | | | | | | | |
| 7. Sustainable intensification indicators | | | | | | | | | | | |
| 7.1 Productivity | |  | | | | | | | | | |
| 7.2 Environmental | |  | | | | | | | | | |
| 7.3 Economic | |  | | | | | | | | | |
| 7.4 Social | |  | | | | | | | | | |
| 7.5 Human | | Number of postharvest technologies and practices under research, under field testing or disseminated with farmers, researchers, extension staff, and development partners. | | | | | | | | | |

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| Sub-activity 1.2: | Train farmers in cooperatives principles, contracting and post-harvest handling and quality management | | | | | | | | | | |
| **Research team** | | | | | | | | | | | |
| Name | | | | Institution | | | Role | | | | |
| Oumar B. SAMAKE | | | | AMEDD | | | Leader | | | | |
| Pierre COULIBALY | | | | AMEDD | | | Substitute | | | | |
|  | | | | | | | | | | | |
| **e. Student(s)** | | | | | | | | | | | |
| Name | | | Institute | | | Degree | | | Start | | End |
| **f. Location(s)** | Koutiala, Bougouni, Yorosso, Sikasso | | | | | | | | | | |
| **g. Start** | August 2017 | | | | | | | | | | |
| **h. End** | *December 2017* | | | | | | | | | | |
| **1. Justification** | | | | | | | | | | | |
|  | | | | | | | | | | | |
| **2. Objectives** | | | | | | | | | | | |
| *2.1* | | | | | | | | | | | |
| *2.2* | | | | | | | | | | | |
| **3. Research questions** | | | | | | | | | | | |
| **4. Procedures** (survey methods, gender disaggregation, treatments, experimental design, sample size, etc.). | | | | | | | | | | | |
| *4.1 Cluster training will be organized in each of the intervention circles for cooperative managers* | | | | | | | | | | | |
| *4.2 These officials will in turn organize restitution sessions at the level of their respective cooperatives* | | | | | | | | | | | |
| **5. Data to be collected and uploaded** | | | | | | | | Responsibility/Institute | | | |
| *5.1 Number of cooperatives trained* | | | | | | | | AMEDD | | | |
| *5.2 Total number of producers affected by training* | | | | | | | |  | | | |
| **6. Milestones** | | | | | | | | | | | |
| Deliverables | | | | | Means of verification | | | | | Date | |
| 6.1 *Training Module* | | | | |  | | | | | *December 2017* | |
| 6.*2 List of cooperatives* | | | | |  | | | | |  | |
| **7. Sustainable intensification indicators** | | | | | | | | | | | |
| 7.1 Productivity | |  | | | | | | | | | |
| 7.2 Environmental | |  | | | | | | | | | |
| 7.3 Economic | |  | | | | | | | | | |
| 7.4 Social | |  | | | | | | | | | |
| 7.5 Human | |  | | | | | | | | | |
|  | | | | | | | | | | | |

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| --- | --- | --- | --- | --- | --- |
| **8. Budget (US$)** |  |  |  |  |  |
| Outcome/Output/Activity | Sub-activity | Budget Line | IER | AMEDD |  |
| Outcome 2/Output 2/Activity 1 | 1.1 | Personnel |  |  |  |
|  |  | Services |  |  |  |
|  |  | Supplies |  |  |  |
|  |  | Capital |  |  |  |
|  |  | Travel |  |  |  |
|  |  | Overhead | 1870 |  |  |
|  |  | Total | 11870 |  |  |
| Outcome 2/Output 2/Activity 1 | 1.2 | Personnel |  |  |  |
|  |  | Services |  |  |  |
|  |  | Supplies |  |  |  |
|  |  | Capital |  |  |  |
|  |  | Travel |  |  |  |
|  |  | Overhead | 2805 |  |  |
|  |  | Total | 17805 |  |  |

|  |
| --- |
| **Outcome 4: Effective partnerships to ensure delivery and uptake at scale of SI, technologies and practices are established with farmers, local communities, and research and development partners in the private and public sectors.** |
| **Output 1: Understanding of the social, economic, and institutional constraints to and opportunities for technology adoption from different farm typologies improved.** |

**Activity 2: Map and assess relevant stakeholders to establish dialogue for the exploration of mutual synergies for scaling delivery of validated technologies.**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sub-activity 2.1 | Consolidating existing platforms, concurrently leading multi stakeholder platform meetings at village level, and lead the organization of farmer to farmer exchange visits | | | | | | | | | | |
| **Research team** | | | | | | | | | | | |
| *Name* | | | | *Institution* | | | *Role* | | | | |
| *Oumar B. SAMAKE* | | | | *AMEDD* | | | *Leader* | | | | |
| *Arouna BAYOKO* | | | | *AMEDD* | | | *Substitute* | | | | |
| *Pierre COULIBALY* | | | | *AMEDD* | | | *Substitute* | | | | |
| **e. Student(s)** | | | | | | | | | | | |
| Name | | | Institute | | | Degree | | | Start | | End |
| 1. | | |  | | |  | | |  | |  |
| **f. Location(s)** | *Koutiala, Bougouni, Yorosso, Sikasso, Yanfolila* | | | | | | | | | | |
| **g. Start** | *March 2017* | | | | | | | | | | |
| **h. End** | *December 2017* | | | | | | | | | | |
| **1. Justification** | | | | | | | | | | | |
| *From 2014 to the present day, Six platforms have been stablished as part of the project in Koutiala and Bougouni districts. These platforms, which bring together researchers, government technical services, NGOs and producers, held several meetings to discuss the challenges related to the project activities implementation. The consolidation of these platforms will stimulate the appropriation of the project activities by the State extension services and the producers. These platforms will form the backbone of the large-scale dissemination strategy of proven technologies.* | | | | | | | | | | | |
| **2. Objectives** | | | | | | | | | | | |
| *2.1 Analyze the strengths and weaknesses of existing platforms* | | | | | | | | | | | |
| *2.2 Strengthen platform capacity* | | | | | | | | | | | |
| *2.3 Organize an inter-farmers visits on a successful platform case* | | | | | | | | | | | |
| ***3. Research questions*** | | | | | | | | | | | |
| *3.1 Are platforms a tool for large-scale dissemination of proven technologies?* | | | | | | | | | | | |
| **4. Procedures** (survey methods, gender disaggregation, treatments, experimental design, sample size, etc.). | | | | | | | | | | | |
| *4.1 Conduct an analysis of the players of the different platforms with ucinet* | | | | | | | | | | | |
| *4.2 Organize two training sessions for members of existing platforms* | | | | | | | | | | | |
| *4.3 Facilitate the quarterly meetings of the said platforms* | | | | | | | | | | | |
| *4.4 Organize exchange visits between platforms* | | | | | | | | | | | |
| **5. Data to be collected and uploaded** | | | | | | | | **Responsibility/Institute** | | | |
| 5.1 *The categories of actors involved in the platforms, their strength and weakness* | | | | | | | | *AMEDD* | | | |
| *5.2 Number of actors trained* | | | | | | | | *AMEDD* | | | |
| *5.3 Number of meetings and visits held* | | | | | | | | *AMEDD/IP* | | | |
| **6. Milestones** | | | | | | | | | | | |
| Deliverables | | | | | Means of verification | | | | | Date | |
| 6.1 *Study Report* | | | | | *Report Documents List of Participants* | | | | | *December 2017* | |
| 6.2 | | | | |  | | | | |  | |
| **7. Sustainable intensification indicators** | | | | | | | | | | | |
| 7.1 Productivity | |  | | | | | | | | | |
| 7.2 Environmental | |  | | | | | | | | | |
| 7.3 Economic | |  | | | | | | | | | |
| 7.4 Social | |  | | | | | | | | | |
| 7.5 Human | |  | | | | | | | | | |

**Activity 3: Leverage/link and integrate (engagement and outreach) with existent initiatives including Government extension systems to support and encourage the delivery pathways**.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sub-activity 3.1: | Competition organization between communities to stimulate adoption of technological innovations | | | | | | | | | | |
| **Research team** | | | | | | | | | | | |
| *Name* | | | | *Institution* | | | *Role* | | | | |
| *Oumar B. SAMAKE* | | | | *AMEDD* | | | *Leader* | | | | |
| *Arouna BAYOKO* | | | | *AMEDD* | | | *Substitute* | | | | |
| *Pierre COULIBALY* | | | | *AMEDD* | | | *Substitute* | | | | |
|  | | | | | | | | | | | |
| **e. Student(s)** | | | | | | | | | | | |
| Name | | | Institute | | | Degree | | | Start | | End |
| **f. Location(s)** | *Koutiala, Bougouni, Yorosso, Sikasso, Yanfolila* | | | | | | | | | | |
| **g. Start** | *June 2017* | | | | | | | | | | |
| **h. End** | *January 2018* | | | | | | | | | | |
| **1. Justification** | | | | | | | | | | | |
| *The adoption of technologies by farmers often requires appropriate approaches. The competition proved effective for the introduction of new things in the way of farming practices. A competition can encourage a great adoption of the technologies developed / tested by Africa RISING. This approach will also make it possible to mobilize all stakeholders in favor of wider adoption.* | | | | | | | | | | | |
| **2. Objectives** | | | | | | | | | | | |
| *2.1 Mobilization of all stakeholders in favor of wider adoption by farmers* | | | | | | | | | | | |
| *2.2 Test competition approach for the adoption of technologies* | | | | | | | | | | | |
| **3. Research questions** | | | | | | | | | | | |
| *3.1 Is competition an effective strategy for technology adoption?* | | | | | | | | | | | |
| **4. Procedures** (survey methods, gender disaggregation, treatments, experimental design, sample size, etc.). | | | | | | | | | | | |
| *4.1 Lunching competition (mobilization of authorities and others stakeholders)* | | | | | | | | | | | |
| *4.2 Visits and notations with appropriate tools* | | | | | | | | | | | |
| *4.3 proclamation of results and awards* | | | | | | | | | | | |
|  | | | | | | | | | | | |
| **5. Data to be collected and uploaded** | | | | | | | | **Responsibility/Institute** | | | |
| *Area of* land under improved technologies or management practices | | | | | | | | Pierre COULIBALY/AMEDD | | | |
| **6. Milestones** | | | | | | | | | | | |
| **Deliverables** | | | | | **Means of verification** | | | | | **Date** | |
| *6.1 Lunching* | | | | | *List of farmers participating* | | | | | *September 2017* | |
| 6.2 Visit and notation | | | | | *Visit report* | | | | |  | |
| 6.3 Results and award | | | | | *PV of selection, technical report* | | | | |  | |
| **7. Sustainable intensification indicators N/A** | | | | | | | | | | | |
| 7.1 Productivity | |  | | | | | | | | | |
| 7.2 Environmental | |  | | | | | | | | | |
| 7.3 Economic | |  | | | | | | | | | |
| 7.4 Social | |  | | | | | | | | | |
| 7.5 Human | |  | | | | | | | | | |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sub-activity 3.2 | *Strengthen the capacity of NGOs (AMASSA, CAAD, FENAB, GRAADECOM), extensions services (Agriculture, Livestock, Forestry) and farmers organization for the technological packages widely dissemination* | | | | | | | | | | |
| **d. Research team** | | | | | | | | | | | |
| *Name* | | | | *Institution* | | | *Role* | | | | |
| *Oumar B. SAMAKE* | | | | *AMEDD* | | | *Leader* | | | | |
| *Pierre COULIBALY* | | | | *AMEDD* | | | *Substitute* | | | | |
| *Arouna BAYOKO* | | | | *AMEDD* | | | *Substitute* | | | | |
|  | | | | | | | | | | | |
| **e. Student(s)** | | | | | | | | | | | |
| Name | | | Institute | | | Degree | | | Start | | End |
| **f. Location(s)** | *Koutiala, Bougouni, Yorosso, Sikasso* | | | | | | | | | | |
| **g. Start** | *April 2017* | | | | | | | | | | |
| **h. End** | *June 2017* | | | | | | | | | | |
|  |  | | | | | | | | | | |
| **1. Justification** | | | | | | | | | | | |
| *NGOs, private service centers and state extension services can play an important role in the dissemination of food security and nutrition technologies. To achieve the objectives set, it is crucial to reinforce them on the dissemination strategy. This reinforcement will concern technical training and dissemination tools. In partnership with the research centers, AMEDD will share these many experiences in disseminating technologies to enable these structures to participate actively in scaling up and scaling out. Once the local NGOs are equipped with the skills for proper technology dissemination they will be working independently from 2018 onwards to achieve the target set by the project until its completion.s* | | | | | | | | | | | |
| **2. Objectives** | | | | | | | | | | | |
| *2.1 Strengthen the capacity of extension structures on strategies for the dissemination of best bet technologies* | | | | | | | | | | | |
| *2.2 Use appropriate intervention approaches* | | | | | | | | | | | |
| *2.3 Ensure the sustainability of the results* | | | | | | | | | | | |
| **3. Research questions** | | | | | | | | | | | |
| *3.1What are the roles of development structures for the sustainability of technology adoption?* | | | | | | | | | | | |
| **4. Procedures** (survey methods, gender disaggregation, treatments, experimental design, sample size, etc.). | | | | | | | | | | | |
| *4.1 Analysis training needs and updating of training materials* | | | | | | | | | | | |
| *4.2 Training sessions in each district level* | | | | | | | | | | | |
| *4.3 Training farmer’s organization and leader in the communes and villages* | | | | | | | | | | | |
| **5. Data to be collected and uploaded** | | | | | | | | Responsibility/Institute | | | |
| *5.1 List of training needs of different actors* | | | | | | | | AMEDD | | | |
| 5.2 *List of participants in training sessions* | | | | | | | |  | | | |
| **6. Milestones** | | | | | | | | | | | |
| Deliverables | | | | | Means of verification | | | | | Date | |
| *6.1 Analysis training needs and materials* | | | | | *Analysis report, Modules* | | | | | *31 May 2017* | |
| *6.2 Training of structures* | | | | | *Technical report, list of participants* | | | | | *27 June 2017* | |
| *6.3 Training in the communes and villages* | | | | | *Technical report, list of participants* | | | | | *29 August 2017* | |
| **7. Sustainable intensification indicators N/A** | | | | | | | | | | | |
| 7.1 Productivity | |  | | | | | | | | | |
| 7.2 Environmental | |  | | | | | | | | | |
| 7.3 Economic | |  | | | | | | | | | |
| 7.4 Social | |  | | | | | | | | | |
| 7.5 Human | |  | | | | | | | | | |

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| **Output 3: A technology adoption, monitoring, and evaluation framework for use by the project team and scaling partners developed and released.** |

**Activity 1: Monitor and modify the progress of technology adoption process towards scaling.**

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| Sub-activity 1.1 | Scaling up of high yielding hybrids and dual/multi-purpose sorghum for crop and livestock integration and income generation in Sikasso region/Mali | | | | | | | | | | |
| Research team | | | | | | | | | | | |
| *Name* | | | | *Institution* | | *Role* | | | | | |
| Aboubacar TOURE | | | | ICRISAT | | Head of sorghum program/scientific support | | | | | |
| Baloua NEBIE | | | | ICRISAT | | Coordination of activities | | | | | |
| Mamourou SIDIBE | | | | ICRISAT | | Supervision of activities | | | | | |
| Abdoulaye G. DIALLO | | | | IER | | Supervision of activities | | | | | |
|  | | | | | | | | | | | |
| e. Student(s) | | | | | | | | | | | |
| Name | | | Institute | | | | Degree | | Start | | End |
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|  |  | | | | | | | | | | |
| f. Location(s) | Koutiala and Bougouni circles/Mali (528 farmers, 22 villages with 24 farmers per village) | | | | | | | | | | |
| g. Start | April 01, 2017 | | | | | | | | | | |
| h. End | December 31, 2017 | | | | | | | | | | |
|  |  | | | | | | | | | | |
| 1. Justification  In Mali, sorghum and millet are used by farmers as staple food, especially in rural areas. With the continual increasing of livestock coupled with the diminution of natural pastures, crops residues are planning important role in animal feeding. Farmers actually are using landraces residues as fodder but the quantity and especially the quality of this feed is limited. The stems are tall and hard due to high lignin content which negatively influence fodder digestibility. Also, local varieties and improved Open Pollinated Varieties (OPVs) varieties have the yield platooned  New varieties of sorghum combing grain yield (around 2t/ha), fodder yield (15 to 20 t/ha for fresh stover) and quality (green leaves until grain maturity) are now available. In addition to these varieties, hybrids with high yield were developed. These varieties and hybrids were tested during phase one of Africa RISING program in different agro-ecologies and seed production is going-in with farmers’ cooperatives. Therefore this activity was proposed for scaling trough four technology parks, farmers’ fields and through linking farmer’s producers to seed cooperatives where they are available. With these varieties, farmers could make double gain and also increase their productivity and income. | | | | | | | | | | | |
| 2. Objectives | | | | | | | | | | | |
| 2.1 Diversify sorghum varieties grown by farmers by introducing new varieties | | | | | | | | | | | |
| 2.2 Intensify farmers production through dual/multi-purpose sorghum varieties and high yielding hybrids | | | | | | | | | | | |
| 2.3 Ensure availability of dual-multipurpose sorghum/hybrids seed for 2018 activities | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 3. Research questions | | | | | | | | | | | |
| 3.1 N/A | | | | | | | | | | | |
| 3.3 | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc). | | | | | | | | | | | |
| 4.1 Identification of farmers integrating crop and livestock in their production system | | | | | | | | | | | |
| 4.2 Evaluation of variety and hybrids by farmers (men and women) in their fields with farmers’ practices and improved practices (plants density and fertilizer application). | | | | | | | | | | | |
| 4.3 Data collection and analysis | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 5. Data to be collected and uploaded | | | | | | | | Responsibility/Institute | | | |
| 5.1 List of farmers implementing the activity | | | | | | | | Site coordinator and Technician/ICRISAT | | | |
| 5.2 Feedbacks of farmers during field days | | | | | | | | Baloua NEBIE/ICRISAT | | | |
| 5.3 Grain yield | | | | | | | | Baloua NEBIE/ICRISAT | | | |
| 5.4 Plot survey (yields and input costs) | | | | | | | | Felix BADOLO/ICRISAT | | | |
| 5.4 Stover yield | | | | | | | |  | | | |
|  | | | | | | | | | | | |
| 6. Milestones | | | | | | | | | | | |
| Deliverables | | | | | Means of verification | | | | | Date | |
| 6.1 Identification of Farmers testers by site coordinators | | | | | List of testers, phone numbers | | | | | April 30, 2017 | |
| 6.2 Seed and protocols preparation and delivering to site coordinators | | | | | Availability of protocols, seed packages, call site coordinators | | | | | May 31, 2017 | |
| 6.3 Training of sites coordinators, technicians and farmers focal points on trials installation and management | | | | | List of participants, contact information | | | | | June 15, 2017 | |
| 6.4 Farmers field day | | | | | List of farmers visiting trials | | | | | October 30, 2017 | |
| 6.5 Data collection/harvesting and analysis | | | | | Protocols, data base, etc. | | | | | November 30-December 31, 2017 | |
|  | | | | | | | | | | | |
| 7. Sustainable intensification indicators | | | | | | | | | | | |
| 7.1 Productivity | | Yield/ha | | | | | | | | | |
| 7.2 Environmental | |  | | | | | | | | | |
| 7.3 Economic | | Net income/ha | | | | | | | | | |
| 7.4 Social | |  | | | | | | | | | |
| 7.5 Human | |  | | | | | | | | | |
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| Sub-activity 1.2 | Dissemination of sustainable natural resources management technologies implemented as technological packages (contour bunding with agro-forestery options) in the districts of Sikasso, Koutiala, Bougouni, Yorosso | | | | | | | | | | |
| **Research team** | | | | | | | | | | | |
| *Name* | | | | *Institution* | | | *Role* | | | | |
| *Oumar B. SAMAKE* | | | | *AMEDD* | | | *Leader* | | | | |
| *Ousmane DEMBELE* | | | | *AMEDD* | | | *Substitute* | | | | |
| *Pierre COULIBALY* | | | | *AMEDD* | | | *Substitute* | | | | |
| **e. Student(s)** | | | | | | | | | | | |
| Name | | | Institute | | | Degree | | | Start | | End |
| 1. | | |  | | |  | | |  | |  |
| **f. Location(s)** | *Koutiala, Bougouni, Yorosso, Sikasso, Yanfolila* | | | | | | | | | | |
| **g. Start** | *April 2017* | | | | | | | | | | |
| **h. End** | *December 2017* | | | | | | | | | | |
| **1. Justification** | | | | | | | | | | | |
| Sustainable natural resource management technologies are crucial for increasing agricultural production and productivity. The main problem of Malian agriculture is the lack of control over water and land. This problem has increased with the advent of climate change. Several water and land management technologies have been developed and tested in Africa RISING Phase 1. It is important to scale up these technologies by placing great emphasis on women and young farmers. | | | | | | | | | | | |
| **2. Objectives** | | | | | | | | | | | |
| *2.1 Select at least 3 technologies packages for dissemination* | | | | | | | | | | | |
| *2.2 At least 10,000 farmers adopt the technologies disseminated* | | | | | | | | | | | |
| **3. Research questions** | | | | | | | | | | | |
| *3.1 Which technological adoption ensure better food security for households throughout the year according to the localities?* | | | | | | | | | | | |
| **4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc.).** | | | | | | | | | | | |
| *4.1 Communal workshop of information and choice of technological packages* | | | | | | | | | | | |
| *4.2 Contracting with agricultural services centers, NGOs, extension services for disseminate the technologies package in the villages (at least 20% of wowen farmers)* | | | | | | | | | | | |
| *4.3 Monitoring and exchange visits* | | | | | | | | | | | |
| *4.4 Feedback of communities* | | | | | | | | | | | |
| 5**. Data to be collected and uploaded** | | | | | | | | **Responsibility/Institute** | | | |
| *5.1 Number of affected producers* | | | | | | | | AMEDD | | | |
| *5.2 Area under proven technologies* | | | | | | | | AMEDD | | | |
| **6. Milestones** | | | | | | | | | | | |
| **Deliverables** | | | | | **Means of verification** | | | | | **Date** | |
| *6.1 Technology Data Sheets* | | | | | *Contracts, Activity Report* | | | | | *December 2017* | |
| *6.2 Identification of technologies packages* | | | | | *Workshop report* | | | | | *31 May 2017* | |
| *Training and contracting with agricultural services centers, NGOs, extension services* | | | | | *Training report, Contracts* | | | | | *15 June 2017* | |
| *Dissemination of package in the villages* | | | | | *List of farmer adopting technologies* | | | | | *June to august 2017* | |
| *Monitoring and exchange visit* | | | | | *Monitoring report, list of farmers* | | | | | *August to September 2017* | |
| **7. Sustainable intensification indicators N/A** | | | | | | | | | | | |
| 7.1 Productivity | |  | | | | | | | | | |
| 7.2 Environmental | |  | | | | | | | | | |
| 7.3 Economic | |  | | | | | | | | | |
| 7.4 Social | |  | | | | | | | | | |
| 7.5 Human | |  | | | | | | | | | |

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| Sub-activity 1.3 | Promote the use of both vegetables and agroforestry species (tomato, aubergine, okra, tamarind, baobab, moringa) | | | | | | | | | | |
| **d. Research team** | | | | | | | | | | | |
| ***Name*** | | | | ***Institution*** | | | ***Role*** | | | | |
| Oumar B. SAMAKE | | | | *AMEDD* | | | *Leader* | | | | |
| Pierre COULIBALY | | | | *AMEDD* | | | *Substitute* | | | | |
| *Ousmane DEMBELE* | | | | *AMEDD* | | | *Substitute* | | | | |
| **e. Student(s)** | | | | | | | | | | | |
| **Name** | | | **Institute** | | | **Degree** | | | **Start** | | **End** |
| *1.Moumouni TOURE* | | | *IPR USFRA* | | | *Ingenieur* | | | *Oct 2017* | | *Dec 2022* |
| *2. Abdoulaye DEMBELE* | | | *IPR USFRA* | | | *Technicien* | | | *Oct 2017* | | *Dec 2019* |
| **f. Location(s)** | *Koutiala, Bougouni, Yorosso, Sikasso* | | | | | | | | | | |
| **g. Start** | *Sept 2017* | | | | | | | | | | |
| **h. End** | *March 2018* | | | | | | | | | | |
| **1. Justification** | | | | | | | | | | | |
| *Market gardening is increasingly practiced by women. In Africa RISING Phase 1, vegetable production technology in association with agroforestry trees (baobab, moringa) has been highly appreciated by rural women. This technology will overcome malnutrition among women and children in the Sikasso region, which is paradoxically a large area of production but with the highest malnutrition rate in Mali. It is therefore a matter of disseminating it on a larger scale.* | | | | | | | | | | | |
| **2. Objectives** | | | | | | | | | | | |
| *21 Reducing child malnutrition by increasing and diversifying market gardening products and agroforestry* | | | | | | | | | | | |
| *2.2 Improving the income of rural women* | | | | | | | | | | | |
| **3. Research questions** | | | | | | | | | | | |
| *How does the association of vegetables and agroforestry species reduce women and children malnutrition?* | | | | | | | | | | | |
| **4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc.).** | | | | | | | | | | | |
| *4.1 Identification of groups of women for the production of vegetables* | | | | | | | | | | | |
| *4.2 Construction or rehabilitation of perimeter market garden* | | | | | | | | | | | |
| *4.3 Facilitating access to inputs and seeds* | | | | | | | | | | | |
| *4.4 Training of women's groups on production, agroforestry, conservation and marketing techniques* | | | | | | | | | | | |
| *4.5 Facilitating the linkage with the market* | | | | | | | | | | | |
| **5. Data to be collected and uploaded** | | | | | | | | **Responsibility/Institute** | | | |
| *5.1 Area of perimeter garden market* | | | | | | | | *Moumouni TOURE /AMEDD* | | | |
| *5.2 Number of househod beneficiary (wowen and children)* | | | | | | | | *Moumouni TOURE /AMEDD* | | | |
| *5.3 Cost and benefice* | | | | | | | | *Moumouni TOURE /AMEDD* | | | |
| **6. Milestones** | | | | | | | | | | | |
| **Deliverables** | | | | | **Means of verification** | | | | | **Date** | |
| *6.1 Identification of beneficiary* | | | | | *List of goups of wowen, legal documents* | | | | | *10 Sept. 2017* | |
| *6.2 Construction or rehabilitation of perimeter market garden* | | | | | *Contract, activity report* | | | | | *2nd October 2017* | |
| *6.3 Training of groups of wowen* | | | | | *Module, Activity report* | | | | | *31 October 2017* | |
|  | | | | | | | | | | | |
| **7. Sustainable intensification indicators** | | | | | | | | | | | |
| 7.1 Productivity | |  | | | | | | | | | |
| 7.2 Environmental | |  | | | | | | | | | |
| 7.3 Economic | |  | | | | | | | | | |
| 7.4 Social | |  | | | | | | | | | |
| 7.5 Human | |  | | | | | | | | | |

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| Sub-activity 1.4 | Development and formalization of local conventions including demarcation of livestock corridors | | | | | | | | | | |
| Research team | | | | | | | | | | | |
| Name | | | | Institution | | | Role | | | | |
| Augustine Ayantunde | | | | ILRI | | | Sub-activity leader (design, data analysis and reporting) | | | | |
| Bougouna Sogoba | | | | AMEDD | | | Facilitation of engagement with local and regional authorities | | | | |
| Siaka Coulibaly | | | | AMEDD | | | Monitoring and facilitation of engagement with the community, and capacity development | | | | |
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| e. Student(s) | | | | | | | | | | | |
| Name | | | Institute | | | Degree | | | Start | | End |
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|  |  | | | | | | | | | | |
| f. Location(s) | Nampossela, Koutiala | | | | | | | | | | |
| g. Start | April 2017 | | | | | | | | | | |
| h. End | February 2018 | | | | | | | | | | |
|  |  | | | | | | | | | | |
| 1. Justification | | | | | | | | | | | |
| From the formalization of the local conventions in 3 Africa RISING communities (Dieba, Sirakele and Zanzoni), the development and formalization of the local conventions provides opportunity for necessary administrative recognition and support at the local government authority (“Commune rurale”). Besides, the feedback from the three communities suggest reduction in cases of conflict as a result of the formalized local conventions. Based on this positive experience of local conventions as local policy instruments to better manage natural resources, the existing oral conventions in another Africa RISING intervention community, Namposella will be formalized. This was based on specific request from the community following the positive experience from formalized local conventions in Dieba, Sirakele and Zanzoni. The formalization will facilitate the use of local conventions for land use planning in the community. | | | | | | | | | | | |
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| 2. Objectives | | | | | | | | | | | |
| 2.1 To document and formalize the existing oral local conventions for better management of natural resources in Namposella and to reduce incidence of conflict | | | | | | | | | | | |
| 3. Research questions | | | | | | | | | | | |
| 3.1 What are the institutional mechanisms for the elaboration and formalization of local conventions? | | | | | | | | | | | |
| 3.2 How does local conventions as policy instrument affect natural resource management? | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc). | | | | | | | | | | | |
| 4.1 Results of the analysis of the existing local conventions in 6 Africa RISING intervention communities in Bougouni and Koutiala showed that the local conventions are oral and informal, which essentially renders them largely ineffective. In addressing this major weakness, we developed and formalized the existing oral conventions in 3 Africa RISING intervention communities namely Dieba, Sirakele and Zanzoni. From the positive impact of the formalized local conventions particularly on natural resource management in these 3 communities, we plan to formalize the existing oral conventions in another community Namposella buiding on the experience from the development and formalization of local conventions in Dieba in Bougouni district, Sirakele and Zanzoni in Koutiala district. Group discussions among the local administrative authorities, technical services and customary leaders will be conducted as well as individual interviews to document the existing oral local conventions and formalize them. Specific tasks that will be involved in the development and formalization of local conventions are: (ii) Meeting of key stakeholders at community level to discuss the processes and modalities for the development and formalization of existing local conventions. (ii) General meeting at the community level to inform and sensitize on the development processes of the existing oral conventions. (iii) Participatory mapping by the community of natural resources and key features in the territory. (iv) Documentation of the existing local conventions in writing and review by the community leaders. (v) Community workshop for the signing of the documented local conventions by key leaders; (vi) Engagement of the local administrative authority and technical services for the review of the texts of the local conventions developed by the community and formalization. (vii) Setting up of village committee to monitor the enforcement of the formalized local conventions. In addition there will be capacity building of the local surveillance committee through training and exchange visit to Yorosso Commune where the local conventions governing natural resource management were well developed. In addition there will be demarcation of 10 km of livestock routes in the territory of Namposella. Together with key natural resource management actors in the community, the livestock routes to be demarcated will be identified and marked. Appropriate government technical services will be involved to ensure that identified livestock routes to be demarcated agree with national transhumance routes, where these exist. Besides, their involvement will also provide the necessary approval for the demarcation of the livestock routes. | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 5. Data to be collected and uploaded | | | | | | | | Responsibility/Institute | | | |
| 5.1 Data on written documented local conventions | | | | | | | | Augustine Ayantunde / ILRI | | | |
| 5.2 | | | | | | | |  | | | |
| 5.3 | | | | | | | |  | | | |
|  | | | | | | | | | | | |
| 6. Milestones | | | | | | | | | | | |
| Deliverables | | | | | Means of verification | | | | | Date | |
| 6.1 Documented and formalized local conventions | | | | | Report | | | | | February 2018 | |
| 6.2 Report of the processes for the development and formalization of the local conventions | | | | | Report | | | | | February 2018 | |
|  | | | | | | | | | | | |
| 7. Sustainable intensification indicators | | | | | | | | | | | |
| 7.1 Productivity | |  | | | | | | | | | |
| 7.2 Environmental | |  | | | | | | | | | |
| 7.3 Economic | |  | | | | | | | | | |
| 7.4 Social | | Reduced cases of conflict management | | | | | | | | | |
| 7.5 Human | |  | | | | | | | | | |

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| **Output 4: Knowledge sharing centers and learning alliances within existent local and regional institutions including development actors developed.** |

**Activity 1: Establish knowledge-sharing and learning alliances among scaling actors.**

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| Sub-activity 1.1 | Africa RISING project management and operation of four technology parks as sites for research and dissemination hubs in Bougouni and Koutiala | | | | | | | | | | |
| d. Research team | | | | | | | | | | | |
| *Name* | | | | *Institution* | | | *Role* | | | | |
| Birhanu Zemadim | | | | ICRISAT | | | Leader | | | | |
| Ramadjita Tabo | | | | ICRISAT | | | Agronomist | | | | |
| Felix Badolo | | | | ICRISAT | | | Economist | | | | |
| Baloua Neibe | | | | ICRISAT | | | Breeder and scaling expert | | | | |
| Jhon Nzungize | | | | ICRISAT | | | Scaling expert | | | | |
| Mahamadou Dicko | | | | ICRISAT | | | Bougouni site coordinator | | | | |
| Karamoko Traore | | | | ICRISAT | | | Koutiala site coordinator | | | | |
| Salmoye Coulibaly | | | | ICRISAT | | | Administrative assistant | | | | |
| Kalifa Traore | | | | IER | | | Soil and Water | | | | |
| Jean-Baptise Tiningire | | | | WorldVeg | | | Agronomist/Breeder | | | | |
| Oumar Samake | | | | AMEDD | | | Koutiala multi-stakeholder facilitator | | | | |
| Tumaini Sidibe | | | | FENABI | | | Koutiala multi-stakeholder facilitator | | | | |
|  | | | | CAAD | | | Scaling | | | | |
|  | | | | GRADCOM | | | Scaling | | | | |
|  | | | | | | | | | | | |
| e. Student(s) | | | | | | | | | | | |
| Name | | | Institute | | | Degree | | | Start | | End |
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|  |  | | | | | | | | | | |
| f. Location(s) | Bougouni and Koutiala | | | | | | | | | | |
| g. Start | 1st March 2017 | | | | | | | | | | |
| h. End | 28th February 2018 | | | | | | | | | | |
|  |  | | | | | | | | | | |
| 1. Justification: Mali Africa RISING project coordination is done by ICRISAT in close collaboration with partner institutes. Four technology parks were established, two in Bougouni (Flola and Diaba villages), and two more in Koutiala (M’Pessoba and N’Golonianasso villages). These parks have been used by participating institutes (ICRISAT, ICRAF, WorldVeg and IER) to conduct controlled research experiments. Training programs have been conducted in the parks for local NGOs, national training centers and communities living in Africa RISING intervention villages. The parks have been used by other programs, like West Africa sorghum improvement program, groundnut improvement program for capacity building and outreach activities. In addition establishment of the parks have avoided independent research and capacity building activities by partner institutes. From phase I of the program it was understood that long-term sustainability of running innovation platforms were not very likely. In this case the four technology parks will be used to conduct multi-stakeholder interest group meetings. The parks were monitored by site coordinators hired for each districts and logistically provided with pick-up cars and drivers. | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 2. Objectives | | | | | | | | | | | |
| 2.1. Conducting an integrated research on sustainable intensification program | | | | | | | | | | | |
| 2.2. Developing a research hub for validating Africa RISING technologies for wider dissemination | | | | | | | | | | | |
| 2.3. Establishing a center for capacity building and short term training activities | | | | | | | | | | | |
| 2.4. Conducting multi-stakeholders interest group meetings | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 3. Research questions | | | | | | | | | | | |
| 3.1. None | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc). | | | | | | | | | | | |
| 4.1. Implementation of research protocols | | | | | | | | | | | |
| 4.2. Conducting training activities | | | | | | | | | | | |
| 4.3. Organization of farmers field days | | | | | | | | | | | |
|  | | | | | | | | | | | |
| 5. Data to be collected and uploaded | | | | | | | | Responsibility/Institute | | | |
| 5.1. All field trial data that include agronomic, and land, soil and water management | | | | | | | | ICRISAT | | | |
| 5.2. All data related to training and farmers field visit | | | | | | | | ICRISAT | | | |
| 5.3. | | | | | | | |  | | | |
|  | | | | | | | | | | | |
| 6. Milestones | | | | | | | | | | | |
| Deliverables | | | | | Means of verification | | | | | Date | |
| 6.1. Data on improved technological practices and participatory research | | | | | Implemented trials, Data upload on CKAN | | | | | December 2017 | |
| 6.2. Report on capacity building (included in the interim and final year) | | | | | Interim and final reports, training reports, farmer field visit reports and community feedback | | | | | August 2017 and Feb 2018 | |
| 6.3. Video demonstration of activities implemented in the park | | | | | Training report, farmer field visit reports and community feedback | | | | | December 2018 | |
|  | | | | | | | | | | | |
| 7. Sustainable intensification indicators | | | | | | | | | | | |
| 7.1 Productivity | | Kindly refer the individual work description | | | | | | | | | |
| 7.2 Environmental | | Kindly refer the individual work description | | | | | | | | | |
| 7.3 Economic | | Kindly refer the individual work description | | | | | | | | | |
| 7.4 Social | | Kindly refer the individual work description | | | | | | | | | |
| 7.5 Human | | Kindly refer the individual work description | | | | | | | | | |
|  | | | | | | | | | | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sub-activity 1.2 | Organization of nutritional clusters in connection with community health centres and rural communes | | | | | | | | | | |
| d. Research team | | | | | | | | | | | |
| Name | | | | Institution | | | Role | | | | |
| Oumar B. SAMAKE | | | | AMEDD | | | Leader | | | | |
| Pierre COULIBALY | | | | AMEDD | | | Substitute | | | | |
| Jeannette KAMATE | | | | AMEDD | | | Substitute | | | | |
| Nantenin DEMBELE | | | | AMEDD | | | Substitute | | | | |
| e. Student(s) | | | | | | | | | | | |
| Name | | | Institute | | | Degree | | | Start | | End |
| 1. Pierre COULIBALY | | |  | | | Master 2 | | | Oct 2017 | | June 2019 |
| f. Location(s) | Koutiala, Bougouni, Yorosso, Sikasso, Yanfolila | | | | | | | | | | |
| g. Start | March 2017 | | | | | | | | | | |
| h. End | December 2017 | | | | | | | | | | |
| 1. Justification | | | | | | | | | | | |
| Community health centers play an important role in Mali's national malnutrition system. Collaboration with these health structures would enable a significant number of women and children to be reached through nutrition activities, including meal consumption based on local agricultural products. This will make it possible to value these products and reduce food expenditure for households with low incomes. | | | | | | | | | | | |
| 2. Objectives | | | | | | | | | | | |
| 2.1 Identify the training needs of support groups in 15 health areas (5 per cercle) | | | | | | | | | | | |
| 2.2 Organize with health centers 05 training sessions in each health center | | | | | | | | | | | |
| 2.3 Follow the restitution sessions of the 05 training sessions in 90 villages | | | | | | | | | | | |
| 3. Research questions | | | | | | | | | | | |
| 3.1How can the cluster approach reach more people through nutrition technologies? | | | | | | | | | | | |
| 4. Procedures (survey methods, gender disaggregation, treatments, experimental design, sample size, etc.). | | | | | | | | | | | |
| 4.1 The training needs are identified in the workshop at the level of the health areas | | | | | | | | | | | |
| 4.2 Training is organized in the form of a nutritional cluster with culinary demonstration | | | | | | | | | | | |
| 4.3 In the demonstration, the focus is on local products | | | | | | | | | | | |
| 5. Data to be collected and uploaded | | | | | | | | Responsibility/Institute | | | |
| 5.1 Number of training and restitution sessions | | | | | | | | AMEDD | | | |
| 5.2 Number of people trained | | | | | | | | AMEDD | | | |
| 5.3 Number of proposed meals | | | | | | | | AMEDD | | | |
| 5.4 Number of persons preparing food in their household | | | | | | | | | | | |
| 6. Milestones | | | | | | | | | | | |
| Deliverables | | | | | Means of verification | | | | | Date | |
| 6.1 Revenue technical data sheets | | | | | Technical report | | | | | Dec 2017 | |
| 6.2 Training modules | | | | | Benefit contract | | | | |  | |
|  | | | | | | | | | | | |
| 7. Sustainable intensification indicators | | | | | | | | | | | |
| 7.1 Productivity | |  | | | | | | | | | |
| 7.2 Environmental | |  | | | | | | | | | |
| 7.3 Economic | |  | | | | | | | | | |
| 7.4 Social | |  | | | | | | | | | |
| 7.5 Human | | Number of households that adopted food | | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **8. Budget (US$)** |  |  |  |  |  |  |  |  |
| Outcome/Output | Sub-activity | Budget Line | ICRISAT | ILRI | AMEDD | CAAD | GRADCOM | FENABI |
| Outcome 4/Output 1/Activity 2 | 2.1 | Personnel |  |  |  |  |  |  |
|  |  | Services |  |  |  |  |  |  |
|  |  | Supplies |  |  |  |  |  |  |
|  |  | Capital |  |  |  |  |  |  |
|  |  | Travel |  |  |  |  |  |  |
|  |  | Overhead |  |  | 5610 |  |  |  |
|  |  | Total |  |  | 35610 |  |  |  |
| Outcome 4/Output 1/Activity 3 | 3.1 | Personnel |  |  |  |  |  |  |
|  |  | Services |  |  |  |  |  |  |
|  |  | Supplies |  |  |  |  |  |  |
|  |  | Capital |  |  |  |  |  |  |
|  |  | Travel |  |  |  |  |  |  |
|  |  | Overhead |  |  | 3740 |  |  |  |
|  |  | Total |  |  | 23740 |  |  |  |
| Outcome 4/Output 1/Activity 3 | 3.2 | Personnel |  |  |  |  |  |  |
|  |  | Services |  |  |  |  |  |  |
|  |  | Supplies |  |  |  |  |  |  |
|  |  | Capital |  |  |  |  |  |  |
|  |  | Travel |  |  |  |  |  |  |
|  |  | Overhead |  |  | 4675 |  |  |  |
|  |  | Total |  |  | 29675 |  |  |  |
| Outcome 4/Output 3/Activity 1 | 1.1 | Personnel |  |  |  |  |  |  |
|  |  | Services |  |  |  |  |  |  |
|  |  | Supplies |  |  |  |  |  |  |
|  |  | Capital |  |  |  |  |  |  |
|  |  | Travel |  |  |  |  |  |  |
|  |  | Overhead | 1870 |  |  |  |  |  |
|  |  | Total | 11870 |  |  |  |  |  |
| Outcome 4/Output 3/Activity 1 | 1.2 | Personnel |  |  |  |  |  |  |
|  |  | Services |  |  |  |  |  |  |
|  |  | Supplies |  |  |  |  |  |  |
|  |  | Capital |  |  |  |  |  |  |
|  |  | Travel |  |  |  |  |  |  |
|  |  | Overhead |  |  | 6545 |  |  |  |
|  |  | Total |  |  | 36545 |  |  |  |
| Outcome 4/Output 3/Activity 1 | 1.3 | Personnel |  |  |  |  |  |  |
|  |  | Services |  |  |  |  |  |  |
|  |  | Supplies |  |  |  |  |  |  |
|  |  | Capital |  |  |  |  |  |  |
|  |  | Travel |  |  |  |  |  |  |
|  |  | Overhead |  |  | 4675 |  |  |  |
|  |  | Total |  |  | 29675 |  |  |  |
| Outcome 4/Output 3/Activity 1 | 1.4 | Personnel |  |  |  |  |  |  |
|  |  | Services |  |  |  |  |  |  |
|  |  | Supplies |  |  |  |  |  |  |
|  |  | Capital |  |  |  |  |  |  |
|  |  | Travel |  |  |  |  |  |  |
|  |  | Overhead |  | 3740 |  |  |  |  |
|  |  | Total |  | 23740 |  |  |  |  |
| Outcome 4/Output 4/Activity 1 | 1.1 | Personnel |  |  |  |  |  |  |
|  |  | Services |  |  |  |  |  |  |
|  |  | Supplies |  |  |  |  |  |  |
|  |  | Capital |  |  |  |  |  |  |
|  |  | Travel |  |  |  |  |  |  |
|  |  | Overhead | 45721 |  |  | 1946 | 1946 | 2805 |
|  |  | Total | 290222 |  |  | 9946 | 9946 | 17805 |
| Outcome 4/Output 4/Activity 1 | 1.2 | Personnel |  |  |  |  |  |  |
|  |  | Services |  |  |  |  |  |  |
|  |  | Supplies |  |  |  |  |  |  |
|  |  | Capital |  |  |  |  |  |  |
|  |  | Travel |  |  |  |  |  |  |
|  |  | Overhead |  |  | 4675 |  |  |  |
|  |  | Total |  |  | 29675 |  |  |  |

**Consolidated Budget**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Budget (US$)** |  |  |  |  |  |  |  |  |  |  |
| Outcome Type | ICRISAT | ILRI | WorldVeg | IER | WUR | AMEDD | CAAD | GRADCOM | FENABI | Total |
| Outcome I | 95000 | 60000 | 10000 | 50000 | 15000 |  |  |  |  | 230000 |
| Outcome II |  | 20000 | 60000 | 20000 |  | 15000 |  |  |  | 115000 |
| Outcome III |  |  |  |  |  |  |  |  |  | 0 |
| Outcome IV | 280500 | 20000 |  |  |  | 135000 | 8000 | 8000 | 15000 | 466500 |
| Subtotal | 375500 | 100000 | 70000 | 70000 | 15000 | 150000 | 8000 | 8000 | 15000 | 811500 |
| Overhead (18.7%) OF SUB TOTAL | 70219 | 18700 | 0 | 13090 | 2805 | 28050 | 1496 | 1496 | 2805 | 138660 |
| Total | 445719 | 118700 | 70000 | 83090 | 17805 | 178050 | 9496 | 9496 | 17805 | 950161 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **9. Results framework, indicators and proposed targets** | | | | | | | | | | | | | |
|  Please make sure to complete all Feed the Future indicators that apply to your sub-activities. Add custom indicators that capture your activities. | | | | | | | | | | | | | |
|  Targets: According to USAID, a target is "the specific, planned level of a result to be achieved within an explicit timeframe with a given level of resources." In the target column, add the number of 'X' that the indicator measures that you expect to accomplish. For example, if you plan to conduct trainings, indicate the number of individuals you are going to train. | | | | | | | | | | | | | |
|  Please disaggregate all indicators by sex (male/female) when possible. Place the disaggregation in the columns labeled "Disagg.". For example, if you plan to train 30 individuals in FY 17, the disaggregation could be the following - Male: 10, Female: 20. | | | | | | | | | | | | | |
|  | Feed the Future or Custom | **FY 2017** | | **FY2018** | | **FY2019** | | **FY2020** | | **FY2021** | | **Life of Project** | **Notes** |
|  |  | **Target** | **Disagg.** | **Target** | **Disagg.** | **Target** | **Disagg.** | **Target** | **Disagg.** | **Target** | **Disagg.** | **Target** | **Optional** |
| **1. Feed the Future** | |  |  |  |  |  |  |  |  |  |  |  |  |
| **1.1** | Number of for-profit private enterprises, producers’ organizations, water users’ associations, women’s groups, trade and business associations and community-based organizations (CBOs) that applied improved organization-level technologies or management practices with USG assistance (4.5.2-42). | 70 |  | 85 | 0 | 105 | 0 | 150 | 0 | 0 | 0 | 0 | 0 |
| **1.2** | Number of ha of land under improved technologies or management practices with USG assistance (4.5.2-2). | 1148 |  | 6070 | 0 | 8150 | 0 | 8325 | 0 | 0 | 0 | 0 | 0 |
| **1.3** | Number of individuals who have received USG-supported short-term agricultural sector productivity or food security training (4.5.2-7) | 4330 |  | 7000 | 0 | 15000 | 0 | 25000 | 0 | 0 | 0 | 0 | 0 |
| Male |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Female |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **1.4** | Number of for-profit private enterprises, producers’ organizations, water users’ associations, women's groups, trade and business associations, and community-based organizations (CBOs) receiving USG food security- related organizational development assistance (4.5.2-11) | 145 | 0 | 230 | 0 | 275 | 0 | 350 | 0 | 0 | 0 | 0 | 0 |
| **1.5** | Number of farmers and others who have applied improved technologies or management practices with USG assistance (4.5.2-5) | 9530 |  | 15000 | 0 | 18000 | 0 | 19000 | 0 | 0 | 0 | 0 | 0 |
| Male |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Female |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **1.6** | Number of hectares under improved technologies or management practices as a result of USG assistance (4.5.2(2). | 7.2 | 0 | 9.6 | 0 | 12.8 | 0 | 19.2 | 0 | 0 | 0 | 0 | 0 |
| **1.7** | Number of public-private partnerships formed as a result of FTF assistance (S) 4.5.2(12). | 45 | 0 | 57 | 0 | 67 | 0 | 85 | 0 | 0 | 0 | 0 | 0 |
| **1.8** | Number of members of producer organizations and | 23 | 0 | 37 | 0 | 45 | 0 | 60 | 0 | 0 | 0 | 0 | 0 |
| Male |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Female |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CBOs receiving USG assistance (S) 4.5.2(27). |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **1.9** | Number of private enterprises (for profit), producers organizations, water users associations, women's groups, trade and business associations, and CBOs that applied improved technologies or management practices as a result of USG assistance (4.5.2(42): (4.5.2-28). | 27 | 0 | 45 | 0 | 55 | 0 | 70 | 0 | 0 | 0 | 0 | 0 |
| **1.10** | Number of technologies or management practices in one of the following phases of development: (Phase I/II/III) (S) 4.5.2(39): | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **1.10.1** | Phase 1 Number of new technologies or management practices under research as a result of USG assistance | 15 | 0 | 16 | 0 | 24 | 0 | 28 | 0 | 0 | 0 | 0 | 0 |
| **1.10.2** | Phase 2 Number of new technologies or management practices under field testing as a result of USG assistance | 9 | 0 | 6 | 0 | 10 | 0 | 12 | 0 | 0 | 0 | 0 | 0 |
| **1.10.3** | Phase 3 Number of new technologies or management practices made available for transfer as a result of USG assistance | 32 | 0 | 20 | 0 | 24 | 0 | 24 | 0 | 0 | 0 | 0 | 0 |
| **1.11** | Number of children under 2 (0-23 months) reached with community level nutrition interventions through USG-supported programs | 1000 |  | 1000 | 0 | 1000 | 0 | 1000 | 0 | 1000 | 0 | 2500 | 0 |
| Male | 250 |  | 250 | 0 | 250 | 0 | 250 | 0 | 250 | 0 | 1250 | 0 |
| Female | 250 |  | 250 | 0 | 250 | 0 | 250 | 0 | 250 | 0 | 1250 | 0 |
| **1.12** | Number of individuals receiving nutrition related professional training through USG-supported programs | 800 | 0 | 800 | 0 | 800 | 0 | 800 | 0 | 800 | 0 | 2000 | 0 |
| Male | 100 | 0 | 100 | 0 | 100 | 0 | 100 | 0 | 100 | 0 | 500 | 0 |
| Female | 300 | 0 | 300 | 0 | 300 | 0 | 300 | 0 | 300 | 0 | 1500 | 0 |
| **2. Custom indicators** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **1** | Number of community-based, regional and national networks and partners established to exchange knowledge and information. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2** | Number of on-farm demonstrations established | 75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **3** | Number of field days organized | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **4** | Number of youth and women participating in project activities | 5615 | 0 | 600 | 0 | 600 | 0 | 600 | 0 | 600 | 0 | 1500 | 2000 |
| Youth | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Women | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **5** | Number of households using climate information or implementing risk-reducing actions to improve resilience to climate change | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **6** | Number of guidelines and training materials developed | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **7** | Number of graduate (MSc and PhD) students trained | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Male | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Female | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **8** | Number of project reports | 8 | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 4 | 0 |
| **9** | Number of journal papers | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **10** | Number of posters, policy briefs, leaflets and films | 2 | 0 | 2 | 0 | 2 | 0 | 2 | 0 | 2 | 0 | 10 | 0 |
| **11** | Number of radio and TV discussions organized | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **12** | Number of households benefiting from nutrition intervention | 1200 | 0 | 1200 | 0 | 1200 | 0 | 1200 | 0 | 1200 | 0 | 6000 | 0 |
| **13** | Percent change in dietary diversity score of farm household in the project intervention communities. | 0.2 | 0 | 0.4 | 0 | 0.4 | 0 | 0.4 | 0 | 0.4 | 0 | 0.4 | 0 |
| **14** | Number of households, especially women with access to home or community garden | 500 | 0 | 500 | 0 | 500 | 0 | 500 | 0 | 500 | 0 | 2500 | 0 |
| **15** | Number of women and youth participating in production and marketing decisions | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Youth | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| women | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **16** | Percent aflatoxin reduction at harvest through use of aflasafe in the field | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **17** | Number of published guidelines on market opportunities and market niches | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **18** | Number of community-based producers' organizations established and/or strengthened for production, processing and marketing. | 20 | 0 | 24 | 0 | 24 | 0 | 24 | 0 | 24 | 0 | 24 | 0 |
| **19** | Number of households clustered to viable value chains by type of market orientation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **20** | Number of agricultural and nutritional enabling policies, regulations and administrative procedures recommended and communicated. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **21** | Number of knowledge sharing centers and learning-alliances developed within existing local and regional institutions. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |